DEPARTMENT OF CITY PLANNING 100 LARKIN STREET · SAN FRANCISCO, CALIFORNIA 94102

SAN FRANCISCO CITY PLANNING COMMISSION

DRAFT ENVIRONMENTAL IMPACT REPORT

HIGH RISE OFFICE BUILDINGS AT
345 Market Street and 45 Fremont Street

EE74.224

August, 1975

Review Period

August 25, 1975 to September 25, 1975

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SUMMARY

The proposed project would consist of two 34-story office buildings, a one-story retail building, a parking garage and a landscaped plaza in the one block area south of Market Street and west of Beale Street. The building at 45 Fremont would provide office space for the Bechtel Corporation and the one at 345 Market would be an investment building with multi-tenant occupancy. The retail building would provide convenience shopping for the neighborhood.

The two office buildings would each provide approximately 535,000 square feet of occupiable space. The retail building would provide approximately 9,000 square feet of retail area. The number of parking stalls on the project site would be reduced from 355 spaces to 100 spaces.

The major adverse impacts of the project would occur during construction. The noise, dust and traffic interference during construction can be reduced by appropriate controls, but cannot be avoided. The project would contribute to the intensification of development of the downtown area south of Market Street. Some local increase in automobile traffic could be expected, but City-wide dependency upon the automobile would tend to decrease because of the increased employment opportunities near public transportation facilities. Public transportation facilities would be more heavily used, particularly during peak periods.

An effect of the high buildings would be increased wind velocity in certain areas approximately 12 percent of the time during the winter. The layout of pedestrian areas would be studied in detail in order to mitigate this effect.

Alternatives considered include the "No Project" alternative, a hotel, expanded retail usage, residential development, alternate building heights and alternate square footages. The project is a phased project. Two different phasing alternatives are described in the Alternatives Section.

DRAFT ENVIRONMENTAL IMPACT REPORT

PROPOSED HIGH RISE DEVELOPMENT

AT 345 MARKET STREET AND 45 FREMONT STREET

SAN FRANCISCO, CALIFORNIA

I. PROJECT DESCRIPTION

A. SITE LOCATION AND OWNERSHIP

The site of the proposed project is a one-block area located in downtown San Francisco. The site consists of the major portion of Assessor's Block 3710, bounded by Market, Mission, Fremont and Beale Streets. Plate 1 illustrates the location of the project area.

The site of the Bechtel II Building at 45 Fremont Street is owned by Bechtel Corporation whose principal office is in the eastern corner of the same block, at 50 Beale Street. One lot of this block, owned and occupied by Greyhound Bus Lines, is not part of the project site. Bechtel and others, representing owners of the remaining property in Block 3710, have entered into a joint venture for development of an investment office building at 345 Market Street and a retail building within the block with parking and loading provisions underground.

B. OBJECTIVES

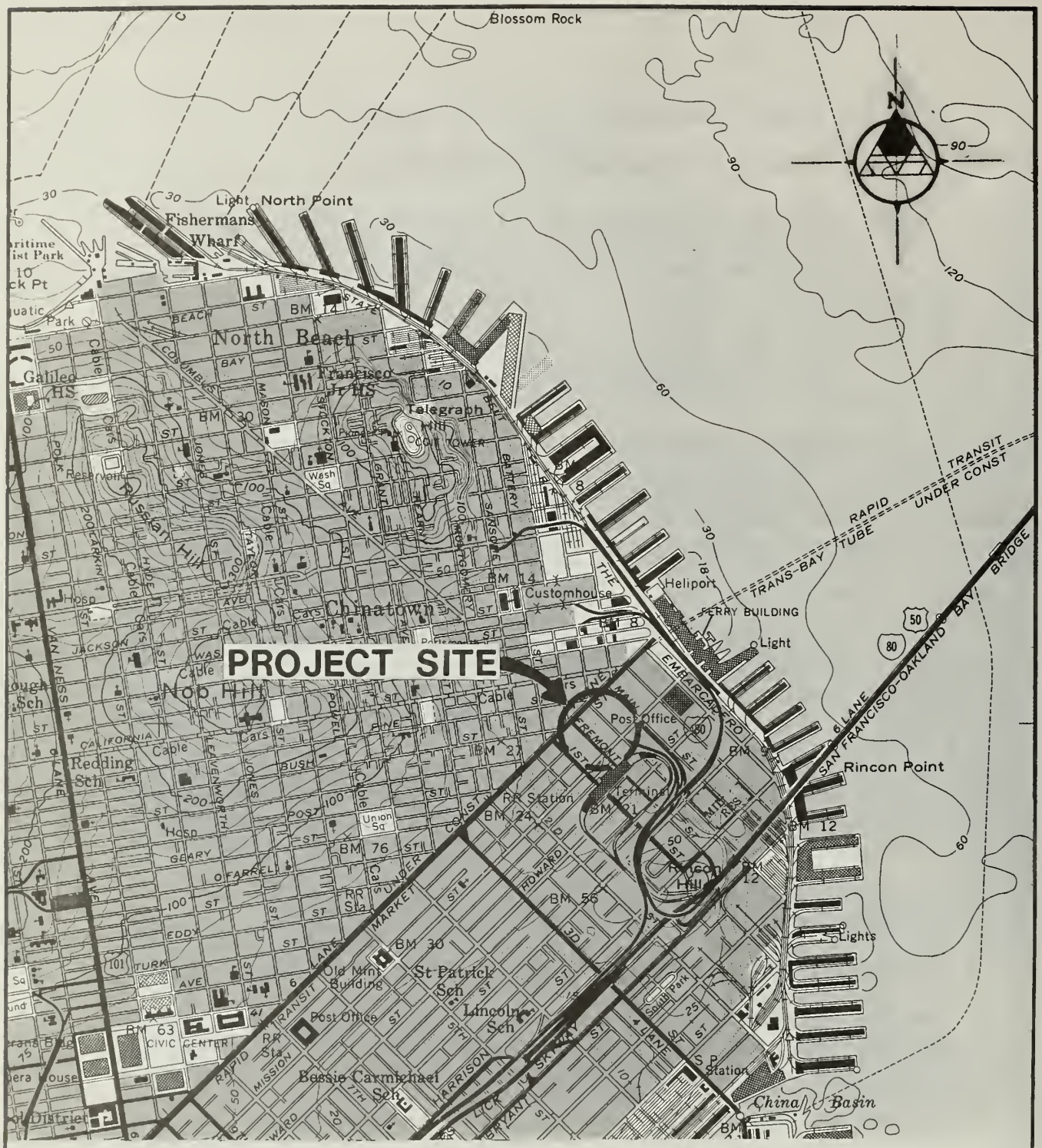
Objectives of the project are to provide the following:

1. A safe, attractive, efficient and economical centralized office area for Bechtel's San Francisco staff. Bechtel facilities in San Francisco are presently in over 20 locations, and a central location is desired in order to reduce the number of such scattered locations.

2. A competitive office building for income producing purposes.

3. Retail facilities for occupants of the new buildings and the vicinity.

4. Convenient parking facilities for Bechtel and tenant employees, and attractive pedestrian accommodations within the development.



SAN FRANCISCO NORTH, CALIF.

N3745—W12222.5/7.5

1956

PHOTOREVISED 1968

AMS 1559 IV SW—SERIES V895

LOCATION MAP

1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

PLATE 1

C. TYPE OF PROJECT

The project proposed for construction would consist of two multi-story buildings and a single story building with paved areas provided for pedestrian movement between buildings in the block. The existing underground Parking garage would remain.

The Bechtel II Building would consist of a 34-story tower with a single basement, a ground level, a mechanical level and 32 office floors providing approximately 535,000 square feet of occupiable area. The investment building would also have 34 stories and approximately 535,000 square feet of occupiable area. Its basement would have a connection to the BART Embarcadero Station.

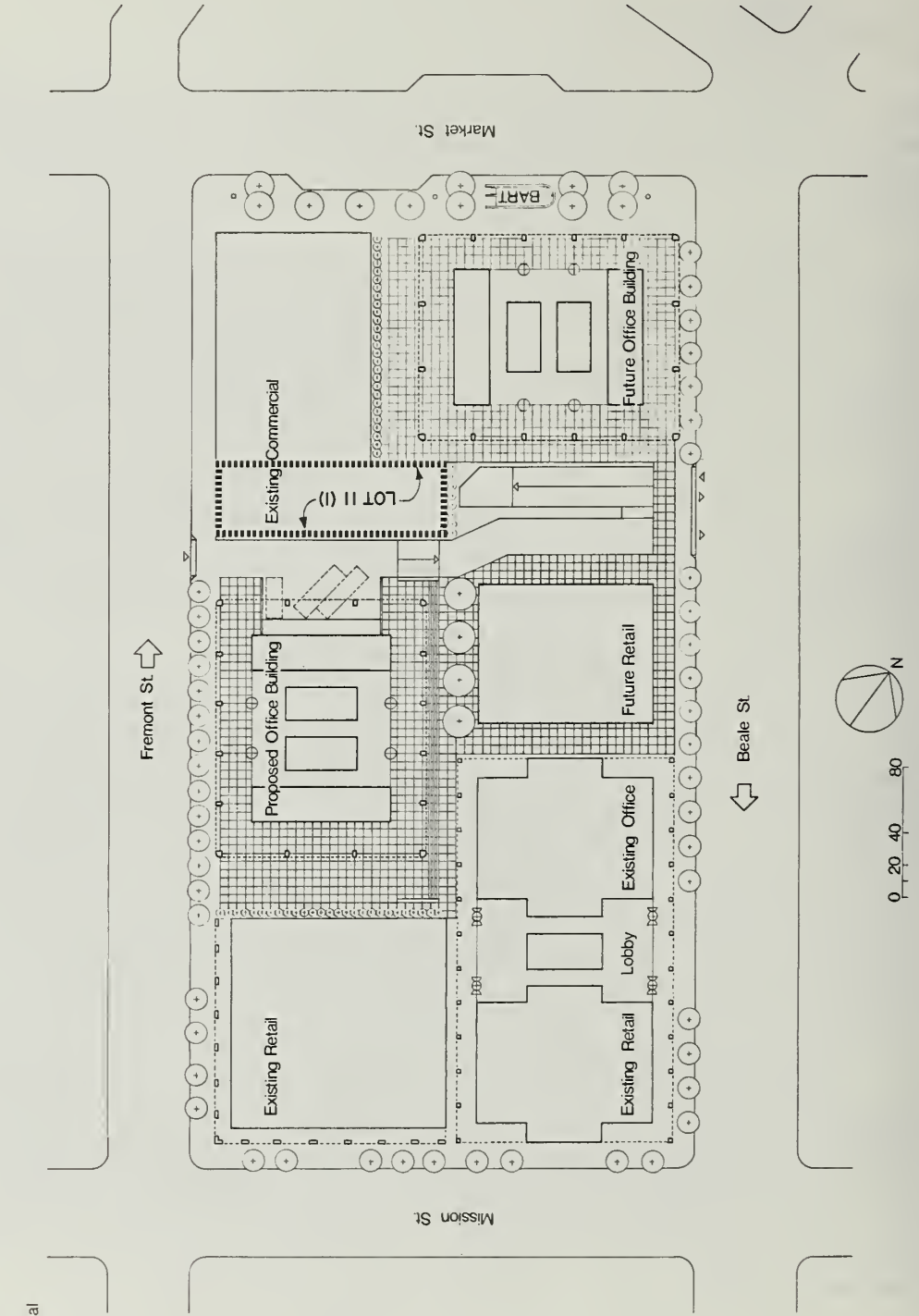
The retail building would face Beale Street and the pedestrian area within the interior of the block. The existing underground parking garage would provide a total of 100 parking spaces. A landscaped area would be developed within the block.

D. PHYSICAL CHARACTERISTICS (See Plates 2 through 6.)

The total height of the office towers would not exceed 475 feet; the applicable height limitation now in effect for the site would permit 600 feet. The dimensions of each of the towers would be approximately 125 x 155 feet which produces a diagonal of less than 200 feet. The code limit, which applies only above 150 feet, would permit a 200-foot diagonal. However, a pedestrian bridge would connect between Bechtel II and the existing 50 Beale Street Building at the fourteenth floor level. A conditional use authorization would be required for this bridge because this connection of the two buildings would technically exceed the bulk limit.

Total gross area of the Bechtel II Building would be approximately 685,000 square feet, including the basement. The ground floor would be taken up by lobby and elevator space. Landscaped areas to be planted are indicated on the Site Plan, Plate 2. Access to the building would be from Fremont Street as well as from the interior pedestrian walkway areas. Off-street loading docks would be provided at the street level as shown on Plate 2.

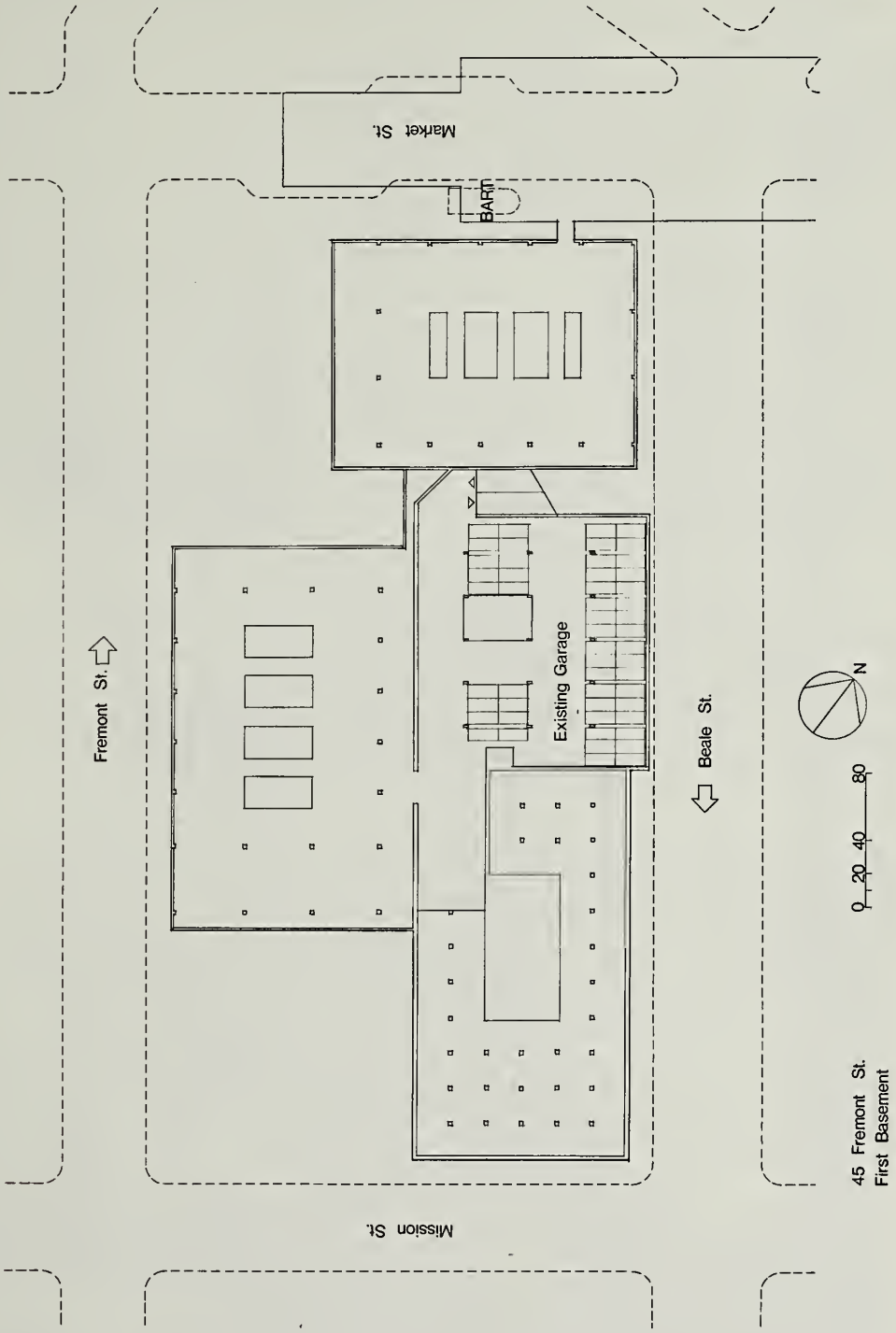
The 34-story tower of Bechtel II would be clad in a metal skin which would be painted in a non-reflective light color chosen to conform with the Urban Design Element of the San Francisco Master Plan. Glass would be a non-reflective tinted glass. The building surface would be a flush wall as shown on Plate 4. Particular attention would be given to the visual relationship between Bechtel II, the existing 50 Beale



NOTE:
(1) LOT 11 WOULD NOT BE PART OF PROPOSED PROJECT SITE

SITE PLAN
TRAFFIC/TRANSPORTATION PLAN
STREET LEVEL

PLATE 2



TRAFFIC/TRANSPORTATION PLAN
FIRST BASEMENT

PLATE 3

Street Building and the investment building facing Market Street. The 50 Beale Street Building employs an essentially flush aluminum wall medium bronze in color. The flush wall of the Bechtel II Building would relate to 50 Beale but would be of lighter color and of different exterior proportion, in order to provide an appropriate variety of visual experience (Plate 4).

The investment office building would be located on the corner of Market and Beale Streets. This building would also be 34-stories high. The street level facade would be set back from the property lines, thus providing for pedestrian circulation along Market and Beale Streets, and to the interior of the block, connecting to the proposed Bechtel II Building. The ground floor would be occupied by the main building lobby. A below-grade connection to BART would be provided with escalators up to street level either within the lobby area or under the building overhang.

The exterior would be a flush or moderately revealed* wall of a light colored material. The building exterior would be designed to be compatible in color and scale with other developments along Market Street as well as the Bechtel II Project. The architect's rendering (Plate 5) shows the flush wall version of the investment building with Bechtel II and 50 Beale Street buildings in the background.

A one-story retail structure located on Beale Street, midway between Mission and Market Streets, would be constructed concurrently with the investment building. It would extend approximately 85' along Beale Street and have a depth of approximately 105'. Total gross area would be 8925 square feet. The building would provide retail area with glass store fronts, facing both Beale Street and the interior pedestrian mall area. The north and south end walls would be masonry or other appropriate material complemented by planting and landscaping. A photograph of the project model (Plate 6) indicates the relationship of the retail building to the entire project.

The joint venture by the lot owners of Block 3710 provides an opportunity to develop a coordinated approach to development, in which the new building elements can be related to each other, both spatially and in terms of form and exterior treatment. Particular attention has been given to the site plan and to pedestrian circulation at ground level. The plan provides for through-block pedestrian movement from all directions. Paved areas would allow for flow around the buildings. Outdoor seating and gathering areas of an intimate scale would be provided. There would be landscaping throughout these areas.

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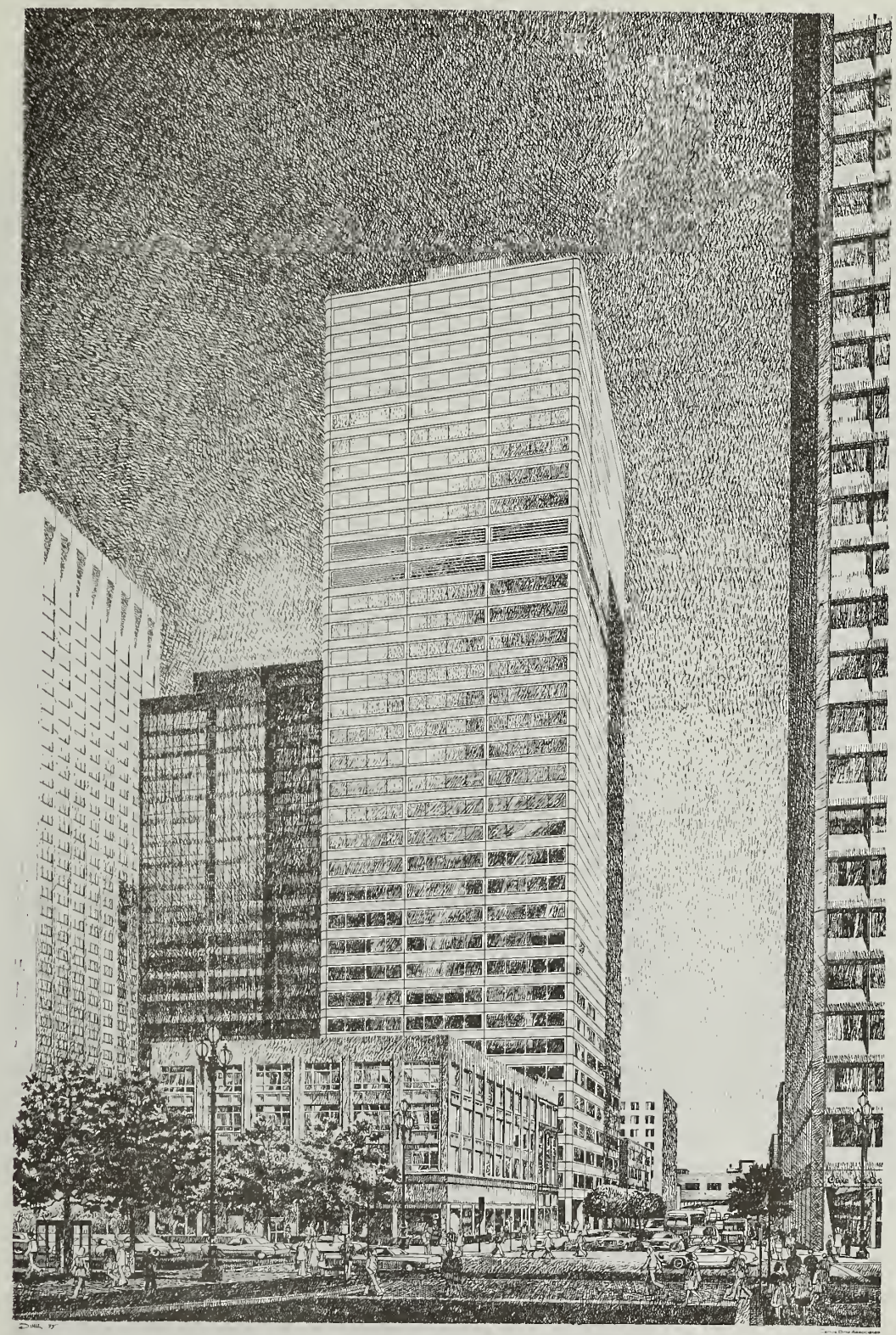
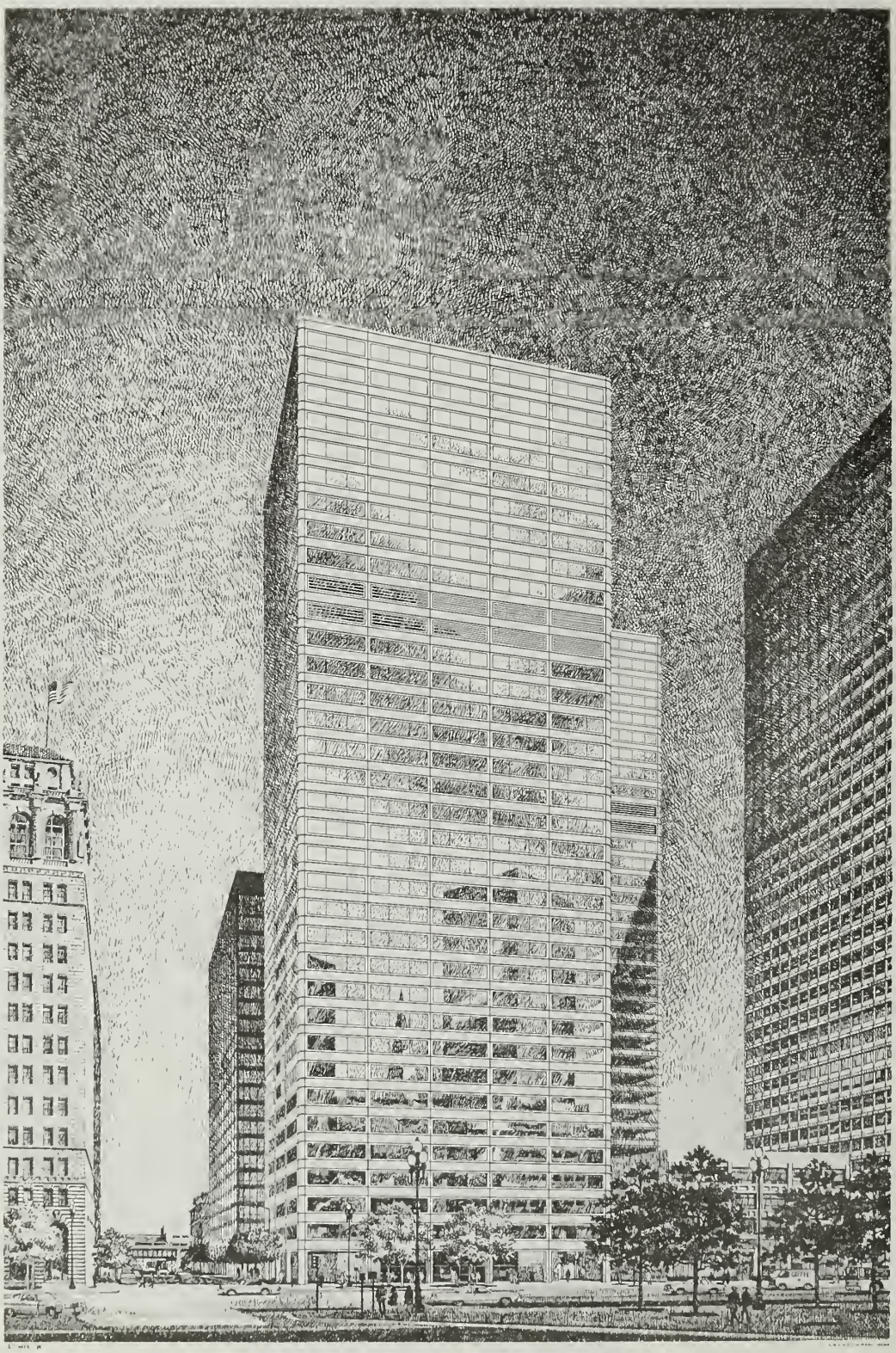
*Windows set back six to twelve inches.



PROPOSED BECHTEL II BUILDING

LOOKING ACROSS MARKET AND FREMONT STREETS

PLATE 4



PROPOSED INVESTMENT BUILDING

LOOKING SOUTH ACROSS MARKET STREET

PLATE 5

PHOTOGRAPH OF PROJECT MODEL

PLATE 6

E. SITE DESCRIPTION

The site of the proposed development consists of all of Assessor's Block 3710 except Lot 11 as shown on Plate 2. It is bounded by Market and Beale Streets on the northward sides, and by Mission and Fremont Streets on the southward sides.

The total site area is approximately 145,700 square feet, of which approximately 63,018 square feet is covered by existing buildings that would remain and 38,000 square feet by buildings which would be demolished. Approximately 44,682 square feet is presently used for parking.

Existing buildings that would be replaced consist of the following:

ADDRESS	PREVIOUS USAGE	TYPE OF BUILDING
47 Fremont	Storage facility	4-story brick
49 Fremont	Delicatessen, wholesale trade	4-story concrete
341 Market	Offices, two small shops,coffee shop	5-story brick
16 Beale	Offices and bar	4-story brick

The proposed office buildings would cover approximately 41,000 square feet at ground level. The percent coverage would be as tabulated below:

CATEGORY	AREA (SQ. FT.)	PERCENT OF TOTAL SITE
Existing Buildings (to remain)	63,018	43.3
New Towers	41,000	28.1
New Retail Building	8,925	6.1
Total Covered	112,943	77.5
Total Site	145,700	100

The site is relatively flat and level. Much of the area that would be covered by buildings is now utilized as a parking lot, with approximately 350 spaces. The lot is paved with asphalt, and landscaped around all four sides of the main lot (Plate 7). A row of trees has also been planted along one edge of an extension of the main lot.

AERIAL PHOTOGRAPH OF PROJECT SITE

PLATE 7

F. PHASING

It will not be feasible to construct the entire project as described during a single continuous time period. The proposed phasing consists of demolishing the buildings at the site of both office buildings, and construction of the Bechtel II Building. Construction of the investment building and retail building would follow at a later date. During the interim period, the site of the proposed investment building might be used as a parking lot for approximately 75 cars, subject to authorization for a conditional use. Such a lot would be landscaped and screened from Market and Beale Streets according to any required conditions. The area of this parking lot, plus the existing 100-car underground garage, would be approximately 41,000 square feet. This is less than the 91,000 square feet maximum permissible for the existing Bechtel Building at 50 Beale Street and the proposed Bechtel II Building.

II. ENVIRONMENTAL SETTING

A. EARTH

The ground surface is essentially level at very nearly elevation 0.* Prior to the 1850's, the general area of the project site was under water within San Francisco Bay. Between 1870 and 1875, a sea wall was constructed, and the project site was reclaimed from the bay by earthfilling. Accordingly, the site and nearby areas are directly underlain by 20 to 25 feet of sandy fill placed during the 1850's, which may include remains of old ships and related items.

Below the sandy fill material is approximately 30 feet of soft, compressible marine clay, locally termed Recent Bay Mud. The low strength and high compressibility of this layer has dictated that foundation support for virtually all major buildings in the site's neighborhood be provided by piles driven into the next lower soil layer.

The next lower stratum consists of approximately 20 to 30 feet of competent sands (capable of carrying heavy loads). These materials were probably laid down as beach deposits or alluvial deposits, at a time in the geologic past when sea level was lower than it is at present.

Beneath the above described materials is approximately 100 feet of Old Bay Clay with intervening layers of sandy soils. These Old Bay Clay materials were probably deposited during the Pleistocene Epoch (more than 1 million years ago) when the sea was as much as 300 feet below its present level. These materials are quite stiff (non-plastic) and capable of bearing heavy loads.

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* San Francisco Datum: approximately 8.6 feet above mean sea level.

The remaining soil materials consist of varying thicknesses (generally greater than 60 feet) of sands, silts, and clays which lie directly over bedrock known in geologic terms as the Franciscan formation. In this area the rocks of the Franciscan are chiefly sandstone, much of which is of a particular type called graywacke because of its clay content and grain character.

The site is in an area of possible liquefaction as defined in the Blume Report*, and is in a special geological study area.

The depth of non-rock deposits above bedrock, in the profile described above, is in excess of 260 feet. The great depth of soil deposits overlying bedrock is a reflection of the fact that an ancient erosional bedrock canyon once existed along the general area of what is today Market Street.

B. WATER

Groundwater at the site in 1966 was at -9 feet.** Measurements have not been recorded recently, but at nearby locations the level has been lowered to below -20 feet by dewatering (pumping out) of large construction projects between 1966 and 1970. It is likely that the level is now between -10 and -20 feet and may still be rising slowly. The quality of groundwater is not high enough for consideration as a potential economic source of drinking water. Recharge of groundwater is negligible.

Ponding as a result of accumulation of rain water in low spots is infrequent, because surface water generally drains from the paved areas and travels by the way of gutters to the sanitary-storm sewer system. In some areas, surface water may seep into the top layers of soil, and remain perched above an impermeable layer of Recent Bay Mud. In some construction projects such water must be removed during excavation.

C. FLORA AND FAUNA

The only plant cover on the site, except for a few weeds, has been installed as landscaping. Landscaping around the existing parking lot includes eight Liquidamber on the Beale Street side, four eucalyptus, seven redwood and six Liquidamber trees around the other three sides. There are eleven Liquidamber trees and a ten-foot strip of privet hedge planted on that part of the parking lot extending to Fremont Street. Numerous shrubs and flowers growing in pots and planters are placed among the trees along the southeast side of the lot. Ivy is growing along the wall of the building at 20

* John A. Blume and Associates, San Francisco Seismic Safety Investigation, 1974.

**San Francisco Datum. This level (-9 feet) is approximately 1/2 foot below mean sea level.

Beale Street. Ordinary soil flora and fauna are assumed to be associated with the plants.

No visible signs indicate the presence of small animals or birds. None were observed during site visits in July and August 1974.

D. CULTURAL AND SOCIOECONOMIC FACTORS

The block bordered by Market, Mission, Beale, and Fremont is within the part of the city known as "South of Market." Originally, this block was part of Yerba Buena Cove, which extended in an arc from Clark's Point at the foot of Telegraph Hill to the present Montgomery Street, and around to the foot of Rincon Hill. In the early 1800's Yerba Buena Cove was a favorite place for ships to unload their cargo. Ships were often scuttled and left in the cove to be converted into warehouses and offices. With increased shipping activity, a seawall was built along the present Embarcadero, Yerba Buena Cove was filled (1873) and the old ships were buried,including the Byron, which is estimated to be buried at the corner of Market and Beale Streets.* The South of Market area became San Francisco's first industrial area. Assessed valuation in much of the area is very low.

Changes in character of the area have begun recently. Within a period of about five years, Matson, Pacific Gas & Electric and Bechtel have erected office buildings at 100 Mission, 73 Beale and 50 Beale Streets, respectively. Metropolitan Plaza was recently completed and the new Southern Pacific building is under construction.

E. MAN-MADE FACILITIES

1. Structures

There were seven structures existing on the site**, with heights up to 325 feet. These can be seen in the aerial view of Plate 7, on page 11. The building materials are primarily brick and/or concrete, except for 50 Beale Street, which is of steel frame construction. All but one of the structures on the site were at least partially occupied until 1974. The site contains the 23-story Bechtel Building and an adjacent 4-story office building which will remain. The four-story building at 371 Market will also remain. Four 4- and 5-story buildings would be replaced by the new structures.

All upper floor offices were fully occupied in January, 1974, but are now vacant. Ground floor tenants that have relocated are as follows.

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* San Francisco News-Call Bulletin, July 16, 1964.

**In March, 1975 two buildings located at and near the corner of Market and Beale were declared unsafe by the City Fire Department. Demolition of these two buildings was started April 21, 1975.

1. 305 Market St. - Fashion Flower Boutique
   Moved to 98 - 9th St., San Francisco

2. 313 Market St. - The Mexico Jeweler
   Moved to 125 Fremont St., San Francisco

3. 315 Market St. - M & M Coffee Shop
   Moved to 359 Mission St., San Francisco

4. 325 Market St. - Stevens Stationers
   Moved to 7 First St., San Francisco

5. 345 Market St. - Wardean, Inc. (Score Bar)
   Moved to Sutter St. near Hyde St.,
   San Francisco

6. 12 Beale St. - Office Copy Systems
   Moved to 637 Howard St., San Francisco

7. 49 Fremont St. - Ward Harris (wholesale trade)
   Moved to 731 Sansome Street, San Francisco

These shops had provided approximately 22,500 square feet of retail space.

The other ground floor tenant at 49 Fremont, San Francisco Delicatessen, is scheduled to move on or before August 31, 1975. Relocation plans are unknown. The delicatessen occupies about 3500 square feet of space.

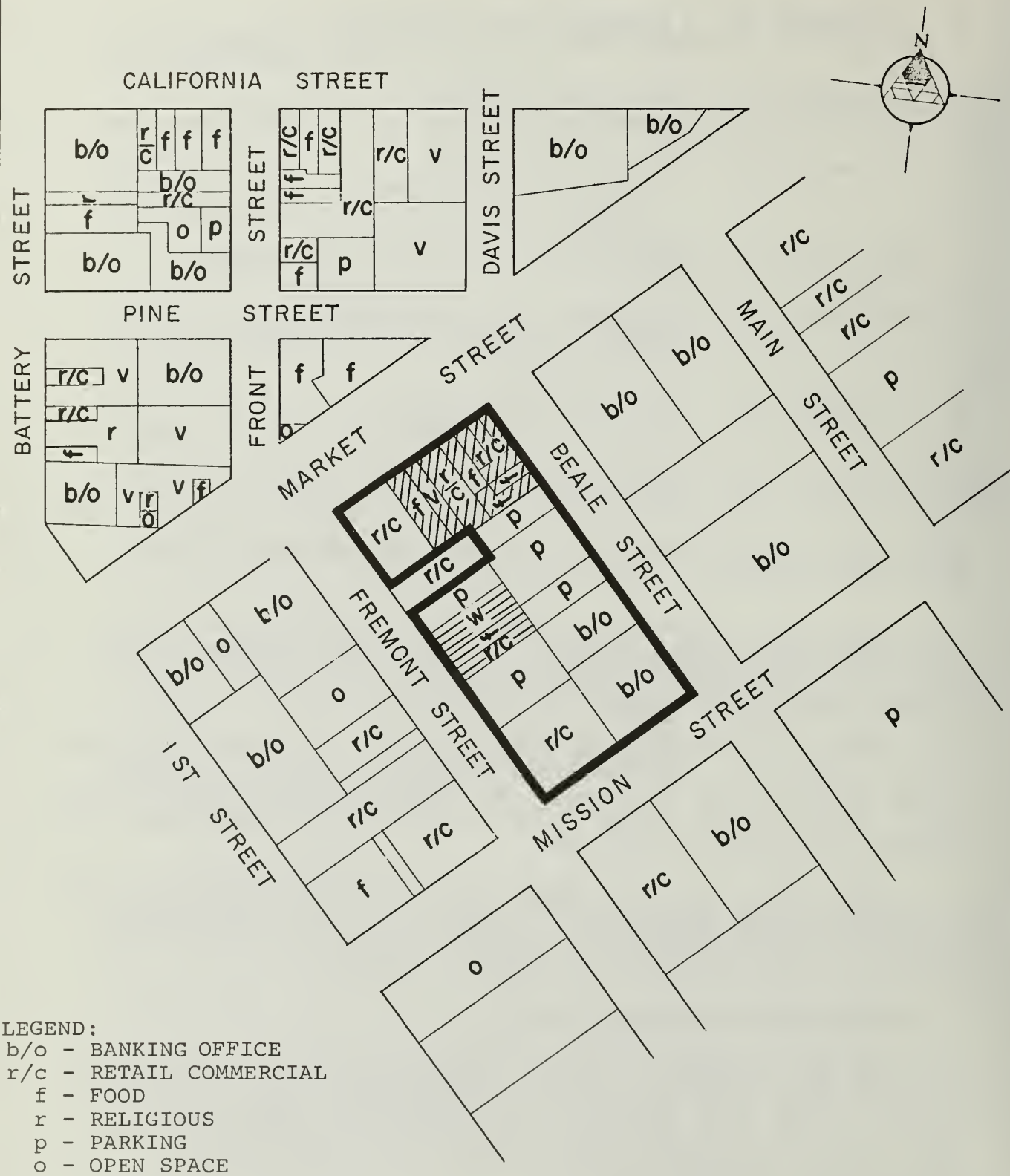
The site is currently within a C-3-0 (Downtown Commercial Office) district. The principal permitted uses are offices, retail business and services. The Height and Bulk district is 600 I, which limits height to 600 feet, length to 170 feet, and diagonal dimension to 200 feet.

The usage, age and height of buildings in the surrounding blocks are shown on Plates 8, 9, and 10. Plate 8 indicates the buildings that would be eliminated by the project. Photographs of these buildings are shown on Plate 11.

2. Highways and Street Network

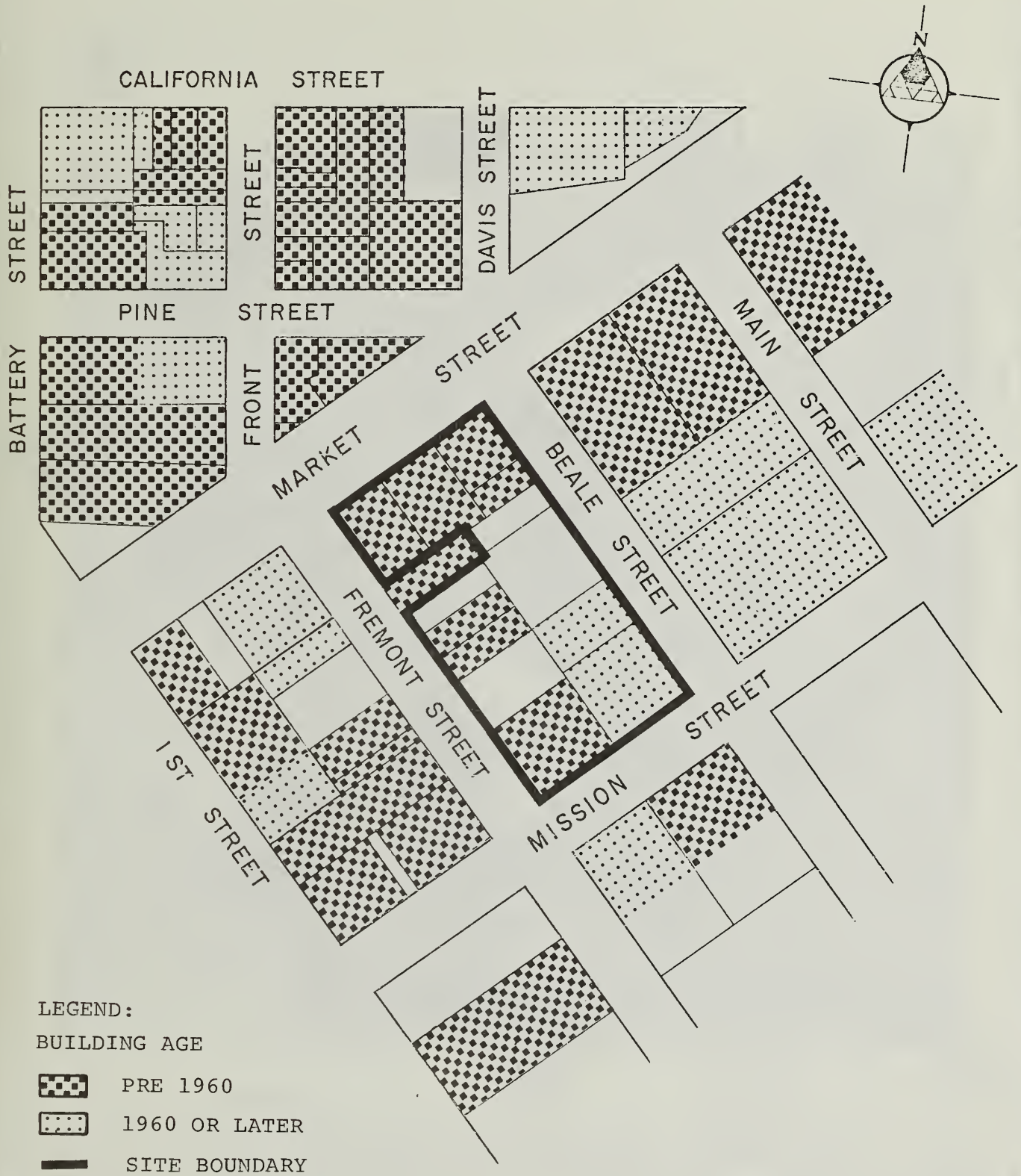
Access to San Francisco and the proposed project site is provided by a variety of means. Highways 101, 80, 280 and 50 provide access over bridges across the Golden Gate and San Francisco Bay, and along the peninsula from the south. A network of city streets provides access within the city and surrounding communities.

Table I gives traffic counts and peak capacities for Beale, Fremont and Mission Streets. Due to construction no recent counts are available for Market Street. The Transportation Element of the Comprehensive Plan designates Market,



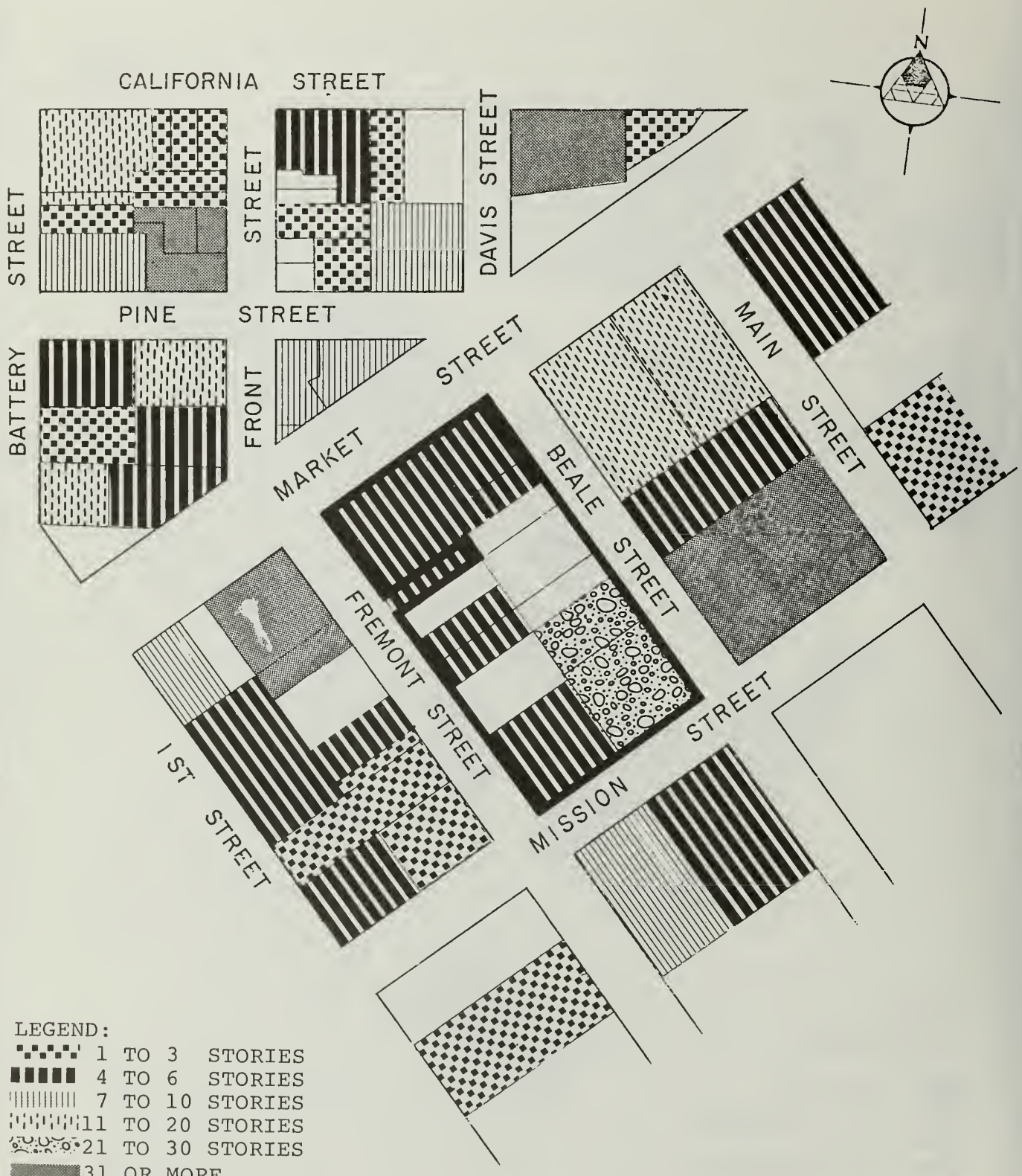
GROUND FLOOR USE IN PROJECT VICINITY

PLATE 8



EXISTING BUILDING AGE IN AREAS AROUND PROJECT SITE

PLATE 9



EXISTING BUILDING HEIGHT IN PROJECT VICINITY

LEGEND:

① SCHEDULED FOR IMMEDIATE DEMOLITION *

② DEMOLITION TO BE SCHEDULED LATER

* DEMOLITION STARTED APRIL, 1975

VIEW SHOWING BUILDINGS TO BE DEMOLISHED

PLATE 11

Mission, Beale, Main, Battery, Pine and Bush Streets as major thoroughfares. These are defined as "cross-town thoroughfares whose primary function is to link districts within the city and to distribute traffic from and to the freeways." Main Street serves as an exit from the freeway and Beale Street provides access to the freeway at Mission Street. The San Francisco Transit Preferential Streets Program assigns priority to transit vehicular movement on Mission Street in this area.* There are no secondary or recreational streets designated in the project area.

TABLE I[1]

TRAFFIC COUNTS AND PEAK CAPACITIES[2]

Street	24 Hours	7a.m.-9a.m.	4p.m.-6p.m.	10a.m.-3p.m.	Peak Capacity[3]	Traffic Lanes
Beale	8153	1202	1790	2333	2000/hr (parking)	4
South of Market southbound December 18, 1972						
Fremont	8076	927	1041	2687	1200/hr (parking)	3
South of Market northbound December 5, 1972						
Mission	6767	640	982	1929	925/hr (no parking)	3
East of Main eastbound June 2, 1969						
Mission	7106	603	1104	1830	925/hr (no parking)	3
East of Spear westbound June 3, 1969						

1. Source: Department of Public Works, Traffic Engineering Division, Bureau of Engineering

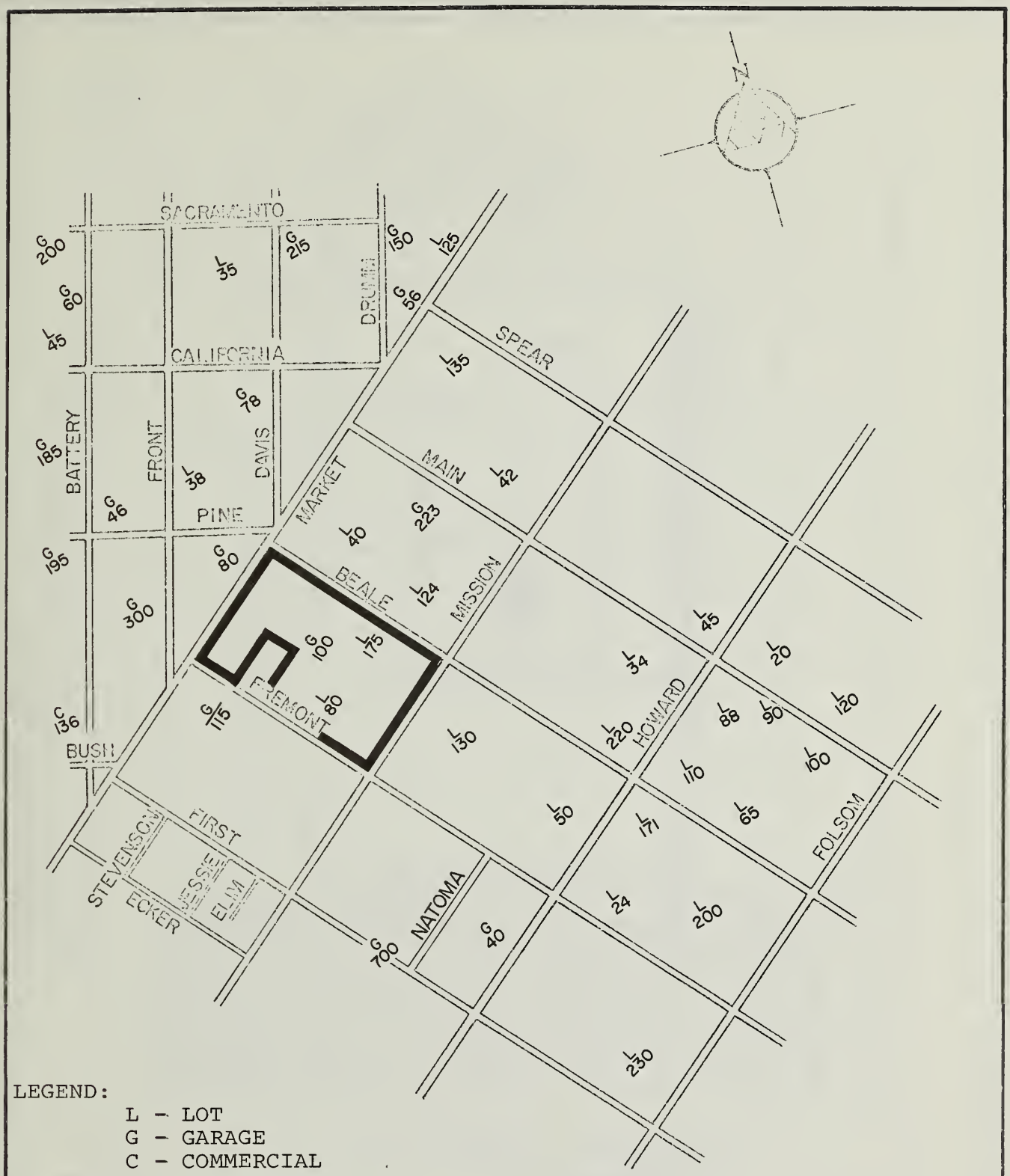
2. Assuming 50 percent green signals, 10 percent commercial vehicles, and 10 percent turns.

3. Between 4 and 6 p.m. during weekdays. At other times Fremont and Mission have only two lanes.

Off-street parking in the area is provided by various garages and lots. Plate 12 shows the size and location of off-street parking facilities within a two-block radius of the project.

Plate 13 illustrates the number, type, and location of on-street parking places, towaway and loading zones in the streets surrounding the project. Plate 14 gives the number and type of on-street parking and loading zones within two blocks of the project.

* Transit Preferential Streets Program - A Joint Report by Public Works, Municipal Railway and City Planning, San Francisco, 1973.

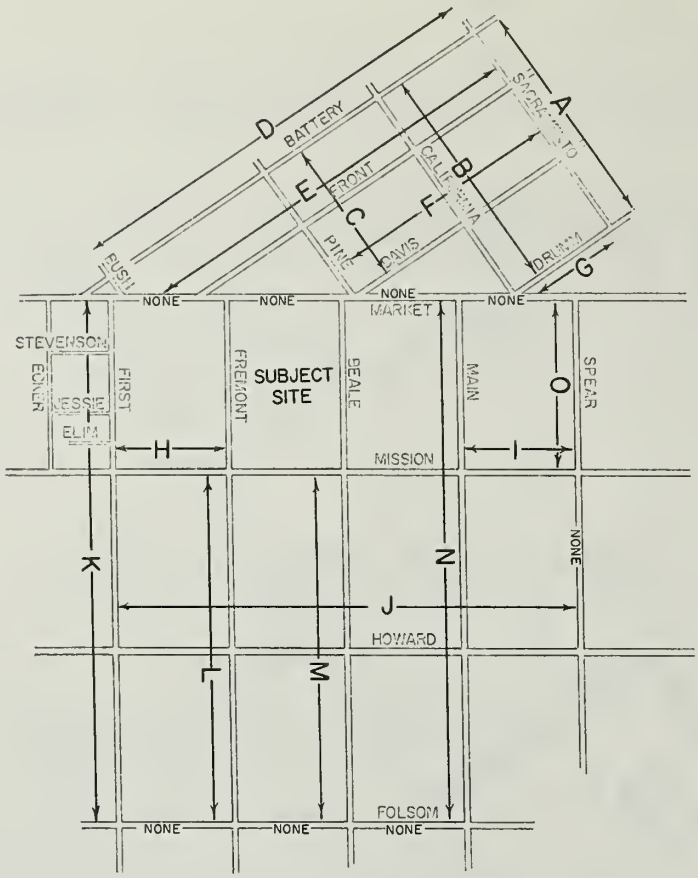


LEGEND:

L – LOT
G – GARAGE
C – COMMERCIAL
SITE BOUNDARY

OFF STREET PARKING IN VICINITY OF PROJECT

PLATE 12



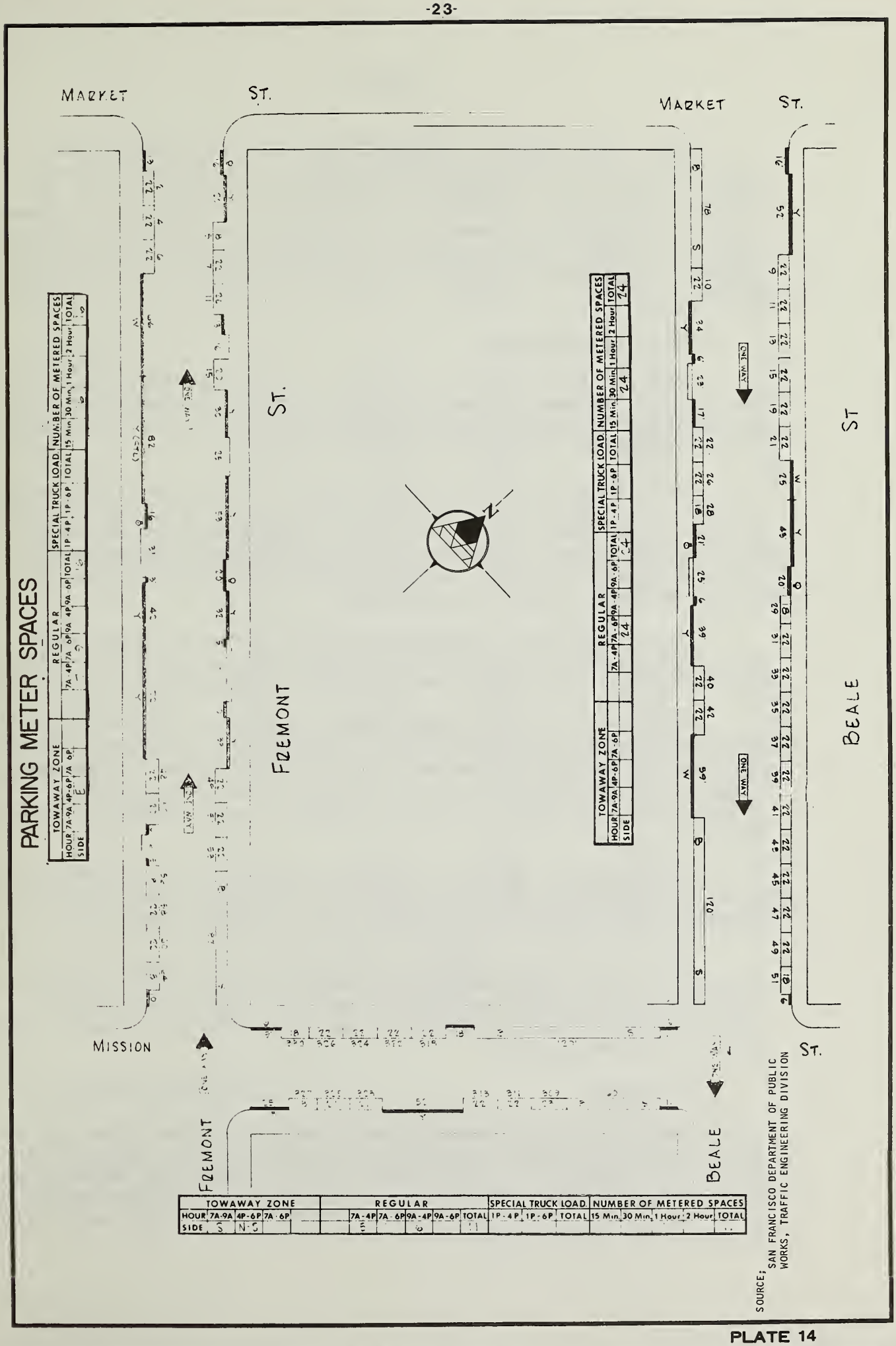
NUMBER LOCATION AND TYPE OF PARKING METERS, LOADING AND TOWAWAY ZONES AND PARKING SPACES

	TOWAWAY ZONE [1]				REGULAR					SPECIAL TRUCK LOADING ZONE			NUMBER OF METERED SPACES [2]				
	7A-9A	4P-6P	7A-6P	24HRS	7A-4P	7A-6P	9A-4P	9A-6P	TOTAL	1P-4P	1P-6P	TOTAL	15MIN	30MIN	1HR	2HR	TOTAL
A		N+S			12				12	6		6		18			18
B	S	S+N			2	4			6					6			6
C	N	N	S				10		10					10			10
D	W	W				1			1	2	18	20		21			21
E		W				8			8		18	18		26			26
F		W			4	13			17	3	8	11		28			28
G						3			3					3			3
H		N			4				4						4		4
I		N+S			9				9						9		9
J						41			41						41		41
K	*	E+W*	W		2	31	7		40						40		40
L						35			35						35		35
M						60									60		60
N				W	57				57		3	3		15	45		60
O						11			11						11		11

1. LETTERS INDICATE SIDE OF SHEET WHERE ZONE IS LOCATED
2. INCLUDES LOADING ZONE SPACES WITH METERS
* PART-TIME BUS ZONE

SOURCE: DEPARTMENT OF PUBLIC WORKS
TRAFFIC ENGINEERING DIVISION
BUREAU OF ENGINEERING

NUMBER, LOCATION & TYPE OF PARKING METERS, LOADING & TOWAWAY ZONES & PARKING SPACES



SOURCE; SAN FRANCISCO DEPARTMENT OF PUBLIC WORKS, TRAFFIC ENGINEERING DIVISION

PLATE 14

The only existing bicycle route in the area of the project is Drumm Street between Market and Jackson Streets. Spear, Market, and Battery Streets are scheduled to be improved as bicycle routes. Bechtel personnel know of no present bicycle commuters to the site. Messenger services produce some bicycle traffic. An average of 30 deliveries and pickups are made by messengers daily to the present Bechtel offices at 50 Beale Street.

3. Transit Services

The project site is located with access to public transportation. Market, Mission, First and Fremont Streets are designated as transit preferential streets by the Transportation Element of the Comprehensive Plan.

Sixteen Municipal Railway bus routes currently provide transit service to the project site or to within one block of the site. The five street car lines that have not been replaced by buses provide service to the Transbay Terminal, one and one-half blocks from the site. Table II gives the usage of these lines in 1973-1974.

Ferry service to Sausalito and Tiburon is available five blocks away. Golden Gate Transit buses provide service to Marin County, and points north, from the Transbay Terminal.

An entrance to the BART Embarcadero Station on Market Street would be provided within the proposed project. BART service is provided from Daly City and from East Bay communities to San Francisco. A. C. Transit buses now provide service from 17 lines in the East Bay directly to the Transbay Terminal.

The Southern Pacific Transportation Company provides rail commuter service from the southern peninsula communitites to the terminal approximately one mile south of the site.

The Muni Metro subway system now under construction is expected to be completed within a year or two. This system will replace certain surface facilities. It will have greater capacity than those facilities replaced, and will reduce loads on the surface system.

4. Railways

Railroad spurs served by the Belt Railroad from tracks along the Embarcadero are still in use, but the volume of traffic is small. The spurs are owned by Southern Pacific Railroad, Santa Fe and others. It is possible that these would be used for delivery of some materials required for construction of the proposed project.

TABLE II

TRANSIT RIDERSHIP

1973-1974 Average

LINE	6a.m. 11p.m.	7a.m. 9a.m	4p.m. 6p.m.	10a.m. 3p.m.	Peak* Capacity
Market St.					
31 Balboa	4937	1399	1432	1182	910
32 Embarcadero	na	na	na	na	na
5 McAllister	5549	1399	1488	1011	1020
7 Haight	2541	568	612	592	340
8 Market	4558	1174	1237	874	830
6 Masonic	3871	957	950	803	600
21 Hayes	4249	747	1018	1179	670
Mission St.					
14 Mission	7691	997	1577	2415	900
12 Ocean	4452	844	857	954	540
9 Richland	1866	498	539	428	390
11 Hoffman	2364	679	672	550	540
STREETCARS					
J Church	5331	1290	1110	1310	810
K Ingleside	7667	1801	1996	1709	1350
L Taraval	8103	2350	1870	1714	1330
M Oceanview	na	na	na	na	na
N Judah	10723	2753	2400	2884	1850
MISCELLANEOUS					
41 Union	4167	1716	1237	497	1130
38 Geary	3507	1975	2777	3114	1530
15 Kearny	3149	937	664	715	540
42 3rd Evans	8648	2338	2458	1725	1760

na - not available
* one-way for one hour
Source: S. F. Municipal Railway
Annual Report 1973-1974

F. RELATED PROJECTS

A 38-story office building is planned for 444 Market Street to be located between Bush and Pine Streets, east of Battery. This building would have first floor retail uses. A two-story retail structure would be attached to the west side of the office tower.

III. ENVIRONMENTAL IMPACT OF PROPOSED PROJECT

A. DEMOLITION

The buildings at 341 Market Street and 16 Beale Street have been vacated and are scheduled for immediate demolition.* Demolition of other existing structures on the site would take place as required by construction schedules. Plate 11 is a photograph showing the buildings to be demolished. Their locations are indicated on Plate 8.

It is anticipated that the demolition process would create short-term noise, vibration, dust and minor traffic congestion.

B. LAND

1. Soil Stability

A potential short-term safety hazard could result from lateral displacement of earth which might occur during the construction phase of the project. Evaluation of such hazards and detailed precautions to prevent such displacements will be based on a future geotechnical investigation. No long-term safety hazards are anticipated.

It is possible for some liquefaction to occur in the upper sand layer during strong earthquakes. However, the potential would be decreased if the project is implemented because the thickness of the sand layer would be decreased by excavation for the basements, and the density would be increased by pile driving. The buildings would be supported on piles driven into material not subject to liquefaction.

2. Land Form Features

Proposed grading operations are within the site limits and, except for basement excavations would consist of cuts and fills. Excavations would be braced during construction to prevent cave-in. The final site grading would require fill in order to conform to the planned landscaping and plaza.

3. Areal Settlements

The foundations of the proposed structures are designed to carry their loads into firm bearing materials below the compressible Recent Bay Mud deposits. The foundation design study would provide an estimate of the settlement that can be anticipated.

---

*Demolition actually started on April 21, 1975.

4. Seismic Response

It is unlikely that the present seismic response of the site would be altered, as soil-structure interaction effects have been shown to be small for structures of the type proposed.* This response has not been calculated, but it is determined principally by characteristics of the soil layers existing above bedrock.

5. Erosion and Sedimentation

The proposed development would not affect the present erosion and sedimentation patterns of the immediate site, as the site is presently covered by pavements and buildings. Runoff is handled by the municipal combined sanitary-storm drain system.

C. WATER

1. Resources and Quality

Preliminary design considerations regarding groundwater levels indicate that drawdown**adjacent to the structures would not be required. The proposed development would not affect the groundwater movements throughout the site.

The possibility of contamination of the local groundwater regime is slight, and would only occur in the event of a utility line leak or break. Groundwater this close to the bay shoreline is not a potential source of drinking water.

2. Runoff and Drainage

The existing buildings, and the asphalt and concrete surface coverings allow little infiltration of the rainwater into the groundwater. The proposed development would provide for more site runoff and drainage, through site grading and installation of storm drain systems within the site area.

3. Sewage (See Section I. 3. - Utilities.)

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* Seed, H. Bolton, Dynamic Characteristics of Soil-Structure Systems, Conference on Planning and Design of Tall Buildings, Lehigh University, August, 1972.

**Pumping of water which decreases the groundwater level beyond the site perimeter.

D. PLANT AND ANIMAL LIFE

The plants now present within the site area are discussed in Section II D. No plants presently on the site would be left standing to be incorporated into the landscaping plans of the project. There are normal urban air and soil microflora associated with both the existing plants and the new plants to be introduced.

The proposed project includes plans for planting of ornamental and/or native plant species at ground level. This would increase the vegetation on the site, both in the number of individuals and in the number of species represented. The plantings would include many trees and shrubs as well as herbaceous flowering plants. This increased vegetation would provide habitats and niches for birds. Landscape plans would be developed, in consultation with the Department of City Planning.

E. METEOROLOGY AND AIR QUALITY

The proposed project would produce localized alterations in wind and temperature fields. The site is currently protected from the prevailing west and northwest winds, but is relatively exposed to winds from the south, east, and north. The south and southeast winds are less frequent than the west and northwest winds, but they are considered important, because they occur during winter storms and are often associated with rain.

Tall buildings generally have the capacity to deflect wind down to pedestrian levels, resulting in discomfort and inconvenience. Wind tunnel tests show that during a west wind the project would provide shelter in its plaza, and wind conditions in the surrounding streets would not deteriorated. In a northwest wind, the project would cause relatively strong winds on Market Street, and moderate winds in parts of the plaza and Fremont Street. However, most of the site would not be seriously affected.

Under south and southwest winds, the project would cause high winds within the plaza and in certain parts of adjacent streets. The project would be likely to increase discomfort during winter storms, which occur less than 12 percent of the time in winter, but which have a high proportion of strong winds. The project would have few detrimental effects under the remaining wind directions.

Further development downtown has not been analyzed in detail, but the wind tunnel results indicate that completion of future buildings nearby would decrease wind velocities within and around the project site.

A general discussion of wind directions from eight compass points is included in Appendix B, Volume 2.

A comfort study, based on results of the wind tunnel studies and a shadow analysis, indicates that relatively uncomfortable areas would exist in passageways between buildings and on the sidewalks southwest of the existing building at Market and Fremont, and northeast of the proposed investment building. The greatest probability of discomfort is in the summer season because of persistent westerly winds and probable lack of heavy clothing. Probability of discomfort at one location on Market Street would be 43 percent, and in one passageway it would be 76 percent. In the fall, these probabilities would be 21 percent and 44 percent respectively. In the spring and winter the highest probabilities are 15 percent and 7 percent respectively. Complete results of the analysis are included in Appendix B, Volume 2.

It is planned to provide interior heating by gas-fired boiler. Emissions from these facilities would include nitrogen oxides and carbon monoxide. Natural gas burns almost completely as a "clean" fuel and emits smaller quantities of undesirable byproducts of combustion than other fuels. It is not expected that the operation of this project would have an impact on local air quality. The project is designed for a firm gas supply and would not require auxiliary fuel.

During construction activities at the proposed site, dust could become airborne due to construction vehicle activity and grading. It is likely that the local air quality would deteriorate from these particulate materials in the atmosphere, and therefore it is important that the abatement procedures discussed in Section V be implemented.

F. TRANSPORTATION AND CIRCULATION SYSTEMS (PUBLIC AND PRIVATE)

The project would continue to provide the 100 underground parking spaces and remove the 255 presently available in surface lots. This reduction in available parking can be expected to result in additional demand for parking in peripheral locations. It is also expected that this decrease in parking supply, combined with accessibility to public transportation, would result in proportionally decreased usage of the automobile by the day-time population of the project site.

The increase in total number of commuters would cause some increase in traffic on the local street system, but a larger impact would be caused by the temporary disruptions due to movement of large construction equipment to and from the project site, and heavy truck traffic during the construction.

The times estimated for various phases of construction of each building are listed below. There would be overlap between some of these so total basic construction time for each building may be less than the sum of the phases.

PERIOD	TIME (MONTHS)
Demolition	3
Excavation and Foundation Concrete	5
Pile Driving	4
Additional Concrete Transit	2
Steel Erection (Delivery period)	6
Exterior Cladding (Delivery period)	4

The greatest interference with smooth flow of traffic would probably result from removal of excavated material and delivery of concrete. It is estimated that as many as 50 trucks per day would enter and leave the site during two periods of two months each. Delivery of steel, cladding and other construction materials may result in as many as 20 trucks per day occasionally, but the average would be lower over a ten-month period. Concrete deliveries are required to be continual throughout the morning. As a result, there could be as many as six trucks entering and leaving the site during the morning peak hour. If truck movements were not properly planned and supervised, these movements could interfere with movement of surface streetcars, which move northward on one set of tracks in the center of Fremont Street. It is anticipated that the regular flow of traffic on Beale, Mission and Fremont Streets would decrease because of construction barricades, and congestion in neighboring streets would increase during the construction period. Afternoon tow-away zones on the north side of Mission and east side of Fremont would be closed if permission can be obtained from the Police Department and City Inspector.

Parking spaces along the barricades would not be usable during the construction period. This would result in overloading of the nearby parking lots and increased business for lots farther away. Some increased usage of public transportation by commuters to this area can be expected to reduce these effects.

In addition to the truck traffic during construction there would be some traffic resulting from construction workers

going to and from work. Most of these automobiles would arrive by 7:30 a.m. and leave by 4:30 p.m., and would not contribute directly to the peak congestion. They would add to the overloading of parking facilities, however.

Traffic increases that would be generated by the project can be estimated as follows: The investment building and the Bechtel II building would each have approximately 3,830 employees, for a total of 7,660. These employees would be commuting to and from the project area each work day. They would reside in many Bay Area communities and use the various transportation modes at their disposal (see Table III). Bechtel visitors would add a few trips during the day, and there would doubtless be some nonpeak period trips from the investment building.

In order to assess the extent of the impact of project on transportation modes, it is necessary to predict the increase in commuters in the project area. Bechtel estimates that 90 percent of the employees in the Bechtel II building would come from other Bechtel offices already in the vicinity. Therefore, only 10 percent (383) of the total number of employees in Bechtel II would impact the various transportation modes to this area. However, if all vacated offices are leased, the number of new employees requiring transportation could be as many as 3,800.

The source of tenants for the investment building cannot be estimated, but if 40 percent are assumed to be presently commuting into the downtown area, the remaining 60 percent(2300) would be new users of the various transportation modes. As would be the case with the Bechtel II building, those who come from the surrounding area would leave office space that may be filled again. The extent of the impact of the project on the area's transportation modes would depend upon the number of old office spaces leased. As the space is leased, impact on transit lines would increase, and would be most noticeable at the intersection of Van Ness and Market Streets, which is the maximum load point for almost all lines using Market Street. Commuters boarding Market Street lines near Van Ness in the evening may experience increased difficulty in boarding vehicles not already at near-crush loads.* The average capacity during the period from 4 to 6 p.m. is 50 to 88 percent utilized. (See Table II, page 22.) The Public Utilities Commission reports that... *there is an uneven distribution of passenger loads on MUNI within this two hour period, with the highest concentration occurring after 5:00 P.M. If future overcrowding on Market*

*Crush loads are defined by the Municipal Railway as a load factor of 1.5, or full seating with half again as many standees.

*Street transit lines is to be alleviated, measures to redistribute peak period ridership on transit may have to be utilized.**

TABLE III

AUTO AND TRANSIT TRIPS GENERATED BY PROJECT

BECHTEL II

RESIDENCE	1.	TOTAL	AUTO	TRANSIT
San Francisco	39	1492	746	746
East Bay	34	1300	728	572
Marin County	10	383	287	96
San Mateo County	13	497	297	182
Santa Clara County	4	153	95	58
TOTAL	100	3825	2153	1672

INVESTMENT BUILDING

RESIDENCE	3.	TOTAL	AUTO	TRANSIT
San Francisco	60	2295	1147	1148
East Bay	13	497	278	219
Marin County	7	268	201	67
San Mateo County	15	574	356	218
Santa Clara County	5	191	118	73
TOTAL	100	3825	2100	1725

1. Percentages derived from present distribution of Bechtel employees.

2. Alameda and Contra Costa Counties.

3. Percentages derived from San Francisco guidelines for transportation impacts.

Source: Bechtel Corporation.
City and County of San Francisco.

*Letter dated 2-26-75 from James J. Finn, Director of Transportation, Public Utilities Commission to Selina Bendix, Environmental Review Officer, Department of City Planning.

The Muni Metro subway system is now under construction. This new facility would reduce the impact of in increased transit ridership along Market Street and help alleviate the loads at Market and Van Ness Streets. When completed, the rail system will have the capability of doubling the existing capacity.* *As reported by the Public Utilities Commission, Muni Metro's anticipated peak quarter-hour rate of capacity is estimated by the transit planning staff to be from 12,000 to 13,000 passengers per hour without undue crowding. However, the P.U.C. states: As continued high rise office development occurs in the lower Market Street area, it is likely that peak period loads on the Muni Metro system will again reach capacity levels.***

According to Walter B. Lewis, Schedule Supervisor for the Muni, lines serving the Embarcadero area of the financial district are experiencing increases due to the recent construction of office buildings in that area. Some of these lines also serve the project area (41 Union, 15 Kearny, 42 3rd Evans).

G. LAND USE

The proposed office development would replace the existing parking lot use and the uses listed on page 17, with the office and retail use described in Section I.C., page 3. Refer to "Growth Inducing Impact" Section for discussion of the effect of the trend toward new office construction on local shops and restaurants.

H. POPULATION

The present daytime population of the proposed site area is approximately 4530 persons. The proposed project would increase the daytime population of the site area to an estimated 12,000 people. This is an increase of 7400. Due to the nature of the planned building use, these people would be predominantly office and retail shop employees. All occupants of 45 Fremont Street and one-third of the remainder would be Bechtel employees.

The projected nighttime population for building operation and maintenance would be less than one percent of the daytime population, assuming that requirements for the new buildings would be similar to those for the Bechtel Building at 50 Beale Street.

Most of the business operations have relocated as tabulated on page 15.

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* Mr. Gerald Cauthen, Supervising Engineer, Municipal Railway, telephone communication, January 10, 1975.

**See footnote on previous page.

I. SERVICES, UTILITIES AND SCHOOLS

1. Fire Protection

The proposed project has been discussed with Chief Gautier of the San Francisco Fire Department.* He states that protection services presently available are adequate to cover the proposed project.

The fire station nearest the proposed project is located on Drumm Street between Market and Sacramento. This is scheduled to be replaced by the new station being constructed at the corner of Sansome and Washington, seven blocks from the project site.

There are currently two sources of water for fire fighting in the area, a low pressure system and a high pressure system designed for reliability during an earthquake. Discussions with Mr. Gilbert Bendix, Superintendent of the Water Supply Bureau of the San Francisco Fire Department, indicated that the water supply system is capable of servicing the proposed project and will continue to be so.** If it is determined that excavation would occur near the high pressure supply system, special precautions would be required to protect the lines from damage.

2. Police

The current crime rate (based on an average number of incidents) in the project neighborhood (Police Plot B-3) is average.*** Development of the project area would result in increased pedestrian and vehicular activity, and it is expected that traffic congestion would be a slightly greater problem than it is now during peak hours. The incidence of crime (robbery, burglary, assault, etc.) in similar office-building environments is very low. The most frequently reported crime in modern high-rise office buildings is theft. The incidence of theft would probably be decreased by the project to an even lower rate, due to security measures in the proposed buildings. The Bechtel II Building would have a 24-hour security guard, with admittance granted to Bechtel employees and authorized visitors only. The investment building would have a closed circuit television monitoring system for elevators and hallways, and a pass required for admittance after 6:30 p.m. It is estimated that additional annual costs to the City for police protection and traffic control would be approximately $40,000.***

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* Telephone communication, August 1974.
** Telephone communication, August 1974.
*** Letter from Officer Bernardini, SFPD Planning and Research November 20, 1974.

3. Utilities

The proposed project would utilize the available water, gas, telephone, electric power and sanitary systems. It is anticipated that these utilities would be underground. The present water lines could accommodate the proposed project without any expansion required.1/ Pacific Gas and Electric 2/ and Pacific Telephone 3/ are prepared to install the necessary additional leads into the project area. (See Appendix A.)

The present combined sewage and storm drainage system has sufficient capacity to accommodate the increased demand resulting from this project. However, the capacity of the North Point Water Pollution Control Plant, which processes the sewage from this area, is frequently exceeded during wet weather when peak flow rates are high. During these periods, the plant operates at capacity and discharges the excess flow untreated into San Francisco Bay at the Howard Street outfall. Additionally, the North Point Plant provides only primary treatment of sewage, and discharges waste into the Bay which does not comply with the water quality requirements of the San Francisco Regional Water Quality Control Board. Consequently, the Regional Water Quality Control Board has served the North Point Plant with a Cease and Desist Order (Resolution No. 72-90, Adopted October 26, 1972). This resolution has been amended to permit operation during a period scheduled for implementing the San Francisco Master Plan for Wastewater Management.

The impact of this project upon the Bay is therefore contingent upon the North Point Pollution Control Plant's compliance with the Regional Water Quality Control Board's resolution. Assuming that the Master Plan for Wastewater Management is fully implemented, the proposed project would have no adverse impact on the water quality of the Bay. Sewage flow from this project would be 0.152 million gallons per day compared to the 65 million gallons per day present load on the North Point plant. This added load represents less than 0.1 percent of the present dry weather demand on the system.

1/ Letter from Mr. C. Wentworth, Engineering Division, S. F. Water Dept., November 11, 1974.

2/ Telephone communication with Mr. Gerald Tyson, Pacific Gas and Electric, September, 1974.

3/ Telephone communication with Mr. Torkelson, Building Industry Consultant, Pacific Telephone Company, September, 1974.

The design of the buildings in the project would conform to applicable laws and codes regarding energy utilization. Specific measures proposed for decreasing energy consumption are given in Section V, page 49.

Anticipated energy usage and utility loads from the proposed project are as follows:[1]

Water (7650 people X 25 gal./person/day = 190,000 gallons/day

Sewage (190,000 gal. water/day X 80%)* = 152,000 gallons/day

Electricity (1,370,000 sq. ft. X 1.49 kwh/mo./sq. ft. = 2,040,000 kwh/month

Gas Heat (1,370,000 sq. ft. X 5.685 Btu/hr./sq.ft.)** = 7,780,000 Btu/hr year-round average

Annual Gas Usage @ 260 days,*** x 12 hr./day X 7.78×10^6 Btu/hr.avg. = 24.3×10^9 Btu/yr.

Peak Gas Consumption = $\frac{18.6 \text{ Million Btu}}{\text{hour}}$

Peak Electric Load = 11,000 kva

Connected Electric Load = 11,000 kw

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1 Except where otherwise noted, the values used in calculating the loads are empirical design values, for the specific building type and occupancy, developed by Jaros, Baum and Bolles for the San Francisco location.

* Criteria for proportioning sewer systems, ASCE Handbook.

** American Society of Heating, Refrigeration and Air Conditioning Engineering Handbook.

***Operating days per year at an average of 12 hours per day.

Curves showing daily and annual electric load distribution are shown on Plates 15 and 16. Daily and annual gas load distribution curves are shown on Plates 17 and 18. The anticipated reduction in elevator and refrigeration load at 2:30 p.m. and the large increase in elevator load at 5:00 p.m. account for the fluctuations in the daily electric load curve in the afternoon.

4. Solid Waste Disposal

Trash removal would be handled by the Golden Gate Disposal Company. According to Mr. Pete Gardella* of that Company the statistics of the National Solid Waste Management Association indicate that one pound of trash would be generated per hundred square feet of usable office space per day. On this basis the proposed project would generate one truck load of approximately five tons of solid waste per day. Golden Gate can accommodate this increased demand, with pickup scheduled for 2:00 to 3:00 a.m.

This project would increase the total city demand for landfill volume by approximately 0.25 percent, thereby decreasing by approximately one week the period remaining for landfill availability. (Mr. Gardella estimates the available space in Mountain View would require eight years to fill.)

J. SOCIAL AND ECONOMIC EFFECTS

With an estimated daytime population increase of about 7400 persons, expenditures by these individuals would amount to several million dollars per year in local shops and service activities. New jobs would be created in the operation and maintenance of the buildings, shops, services and parking facilities. Approximately 60 percent** of the new employees can be expected to come from outside the city. Unemployment within the city would be reduced by the remaining new jobs. There would be increased employment, for on-site labor, amounting to approximately 1,000 person-years during the construction period.

Changes in the area would continue to increase tax revenues to the City and County of San Francisco and the school districts. Present assessed values and tax revenues for the areas that would be affected by construction are shown below:

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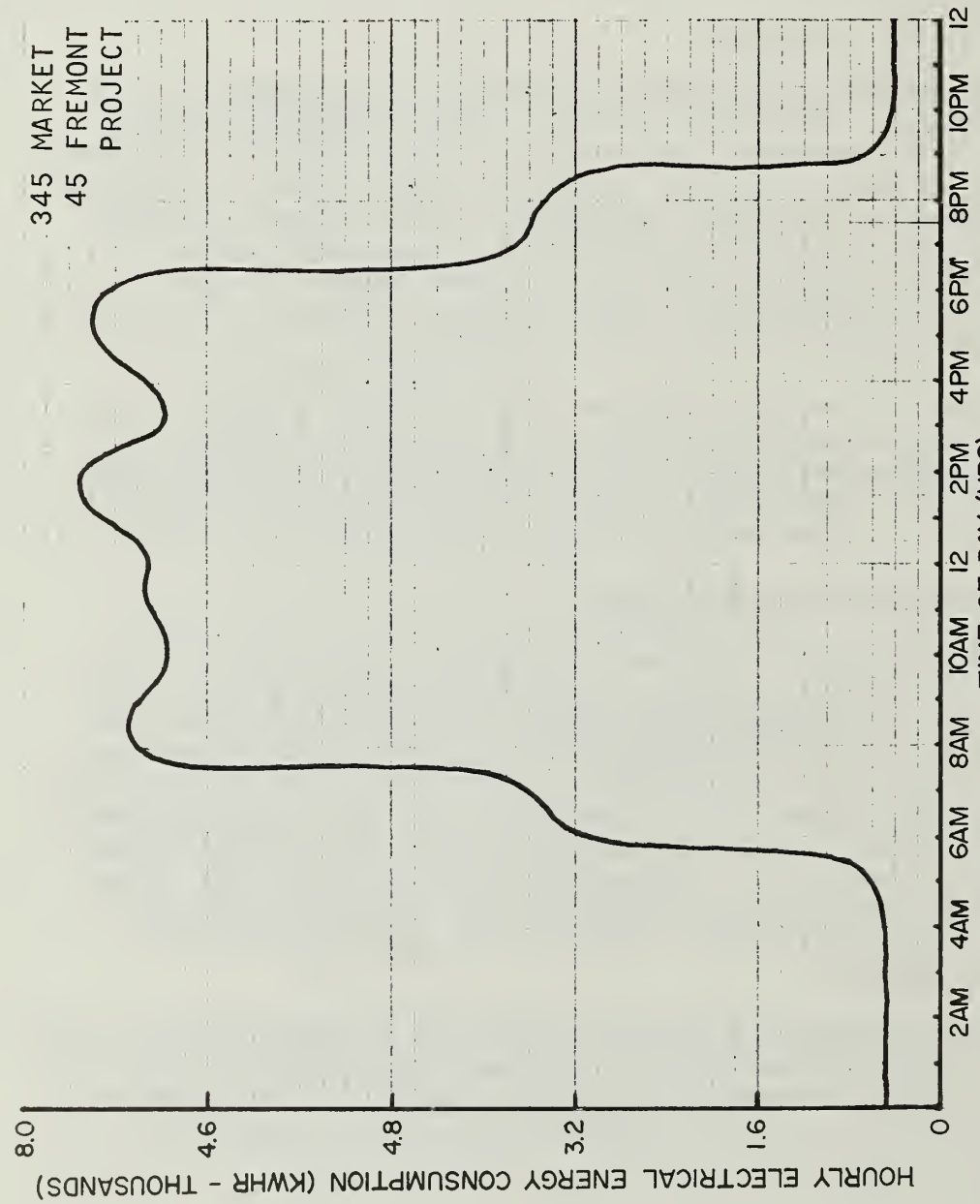
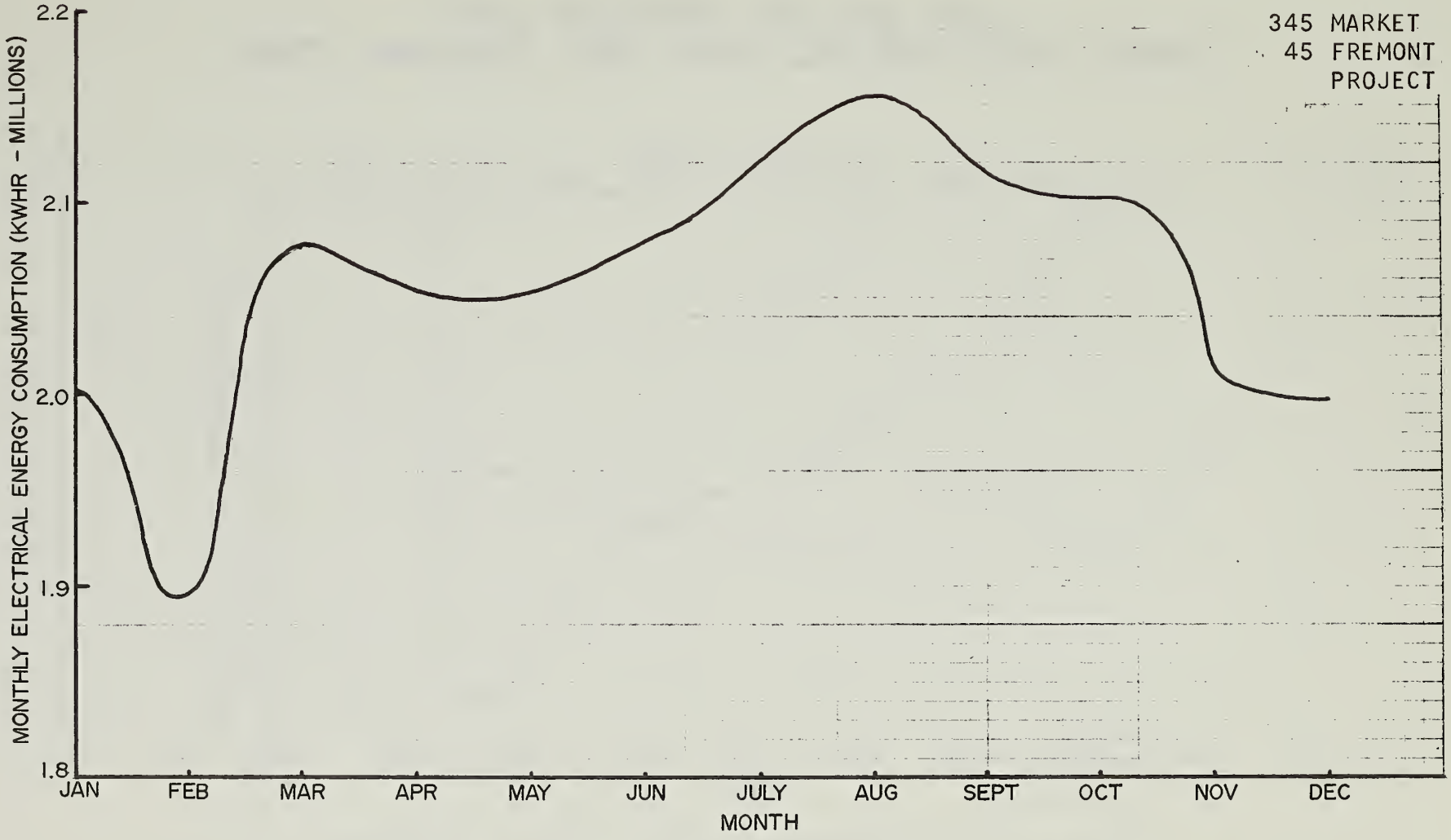
* Telephone communication July 17, 1974.

** Percentage derived from present distribution of Bechtel employees.



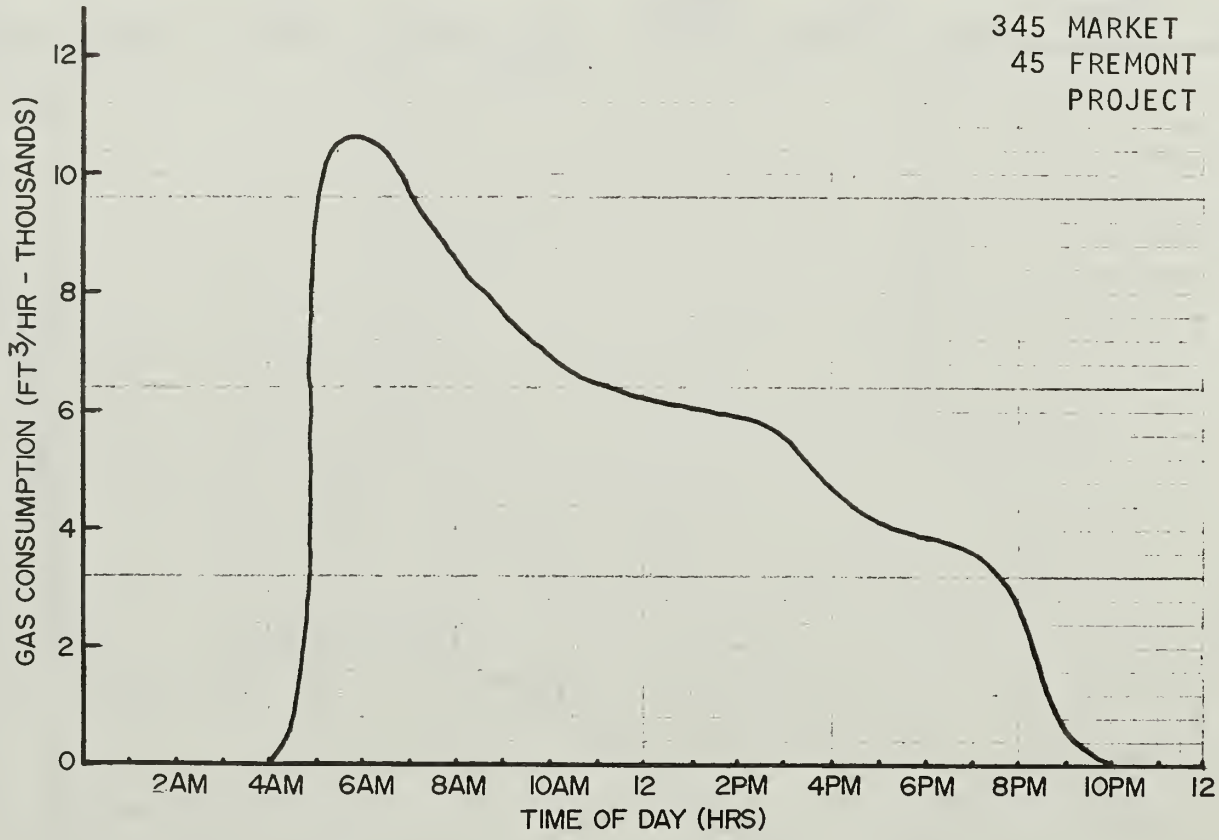
DAILY ELECTRICAL LOAD DISTRIBUTION CURVE (FOR AVERAGE SUMMER DAY)

PLATE 15



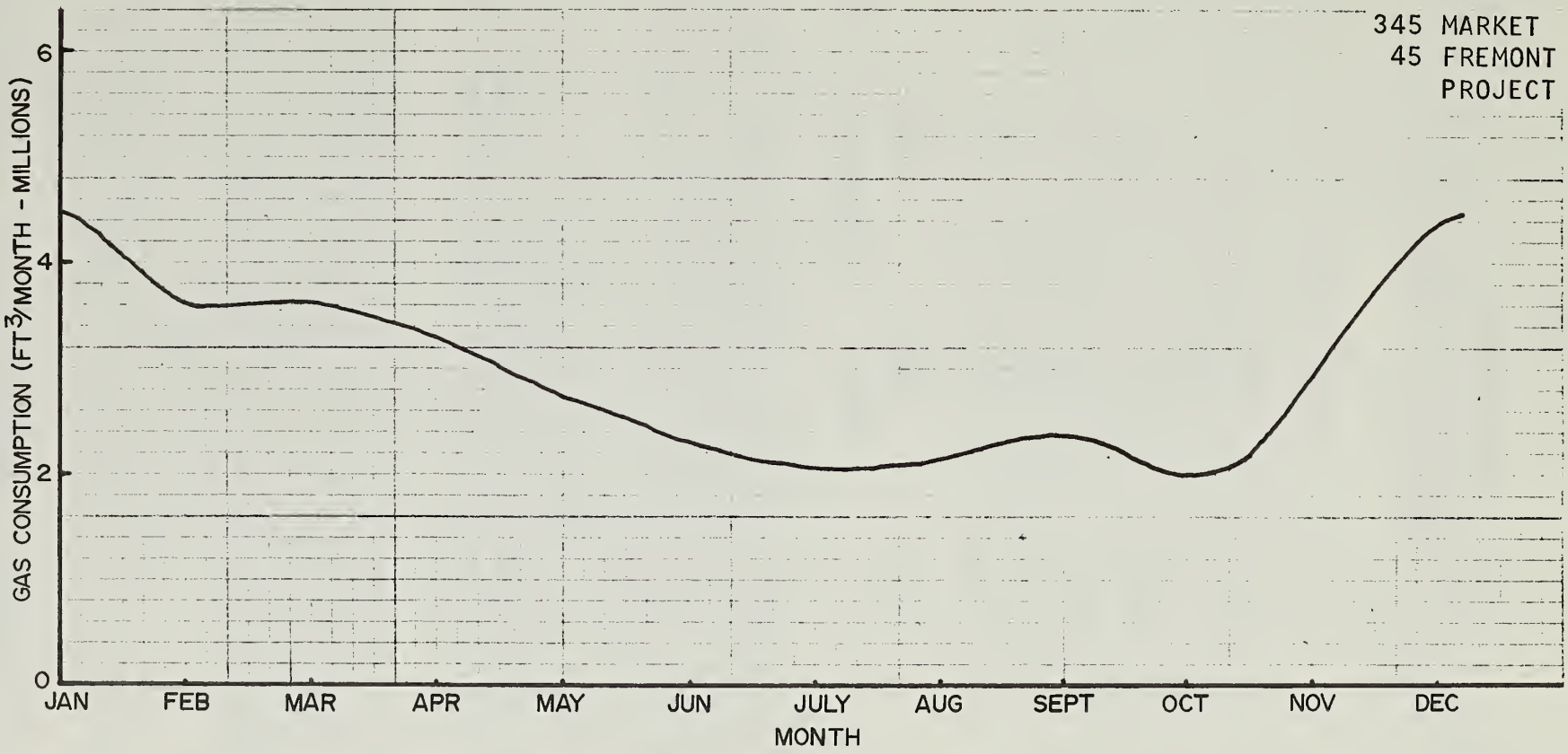
ANNUAL ELECTRICAL LOAD DISTRIBUTION CURVE

PLATE 16



DAILY NATURAL GAS LOAD DISTRIBUTION CURVE (FOR AVERAGE WINTER DAY)

PLATE 17



ANNUAL GAS LOAD DISTRIBUTION CURVE

PLATE 18

Lot No.	Land	Improvements	Total	Taxes* 1973 - 1974
	(Multiply by 1000)			
1	$ 234.6	$ 60	$ 294.6	$ 36,088
1C	22.0	41	63	7,717
2	37.6	52.5	90.2	11,048
13	315.1	89.2	404.3	49,536
14	76.5	137.5	214.	26,215
7	76.2	3.9	80.1	9,818
8	37.8	56.7	94.5	11,579
9	37.8	61.2	99	12,127
10	37.8	0.8	38.5	4,722
TOTALS:	$875.4	$502.8	$1378.2	$168,850

At present the city, county and school districts are realizing less than $170,000 per year in tax revenues from these areas. At an estimated development cost of $80 million, the 1974-75 combined tax rate of $12.75 per $100 of assessed value would increase the revenues to the city by well over $2 million per year.

Additional income would result from sales taxes on local purchases made in the area by that portion of the daytime population new to San Francisco, and from property taxes on new shops and service facilities that would spring up to serve these new people.

Some increased costs may be anticipated because of possible increased requirements for traffic control. Construction of the project buildings should reduce the danger from fire to a level below that for the existing structures, which were built before current building code life safety provisions were incorporated and therefore, requirements for fire protection should be lessened.

In 1974, approximately 5530 persons were employed within the site boundaries. Two hundred fifty of these were in buildings to be demolished. Eighty percent of these were

*Taken from Bechtel Corporation files (City and County of San Francisco secured property tax bill.)

Bechtel employees in temporary quarters who would be moved into the new building when completed. Most of the others have been relocated by their present employers to the locations shown on page 16.

2. Historical or Archeological Sites

The site area is identified in a historic sense with the old downtown business section of San Francisco. However, there are no designated historical buildings, monuments or sites and no known archaeological sites within the project boundaries or immediately adjacent. A map at the Maritime Museum indicates that a buried ship lies in the vicinity of Market and Beale, but this has not been verified. The question regarding a possibility of historical buildings, monuments or sites in the area was discussed at a meeting of the Landmarks Board on January 22, 1975. The minutes of this meeting state, in part: *Board Members had also visited this site and had not observed any buildings of consequence.*

3. Scenic Views and Shadows

Planned building heights are 125 feet below the established height restrictions in this zone. Some views would be blocked for a few occupants of surrounding buildings. Shadows created by the project would have some impact on the surrounding area during cold, windy weather. Three plazas would be within the shadow pattern of the project. These plazas are currently shaded during portions of the day by existing high-rise buildings in the vicinity; shadows from this project would extend this period of shade somewhat, particularly during winter mid-day when the sun is at a lower angle. At other times of the day and season, shadows will generally fall on built-up areas. Plate 19 illustrates typical shadows which would be cast by the towers.

4. Noise and Vibration

Noise and vibration would be generated during construction activities. The greatest noise and vibration levels would result from the pile driving and excavation equipment. It is anticipated that piling foundations would be employed for the building. The following tabulation lists typical noise levels for equipment to be used in the construction.

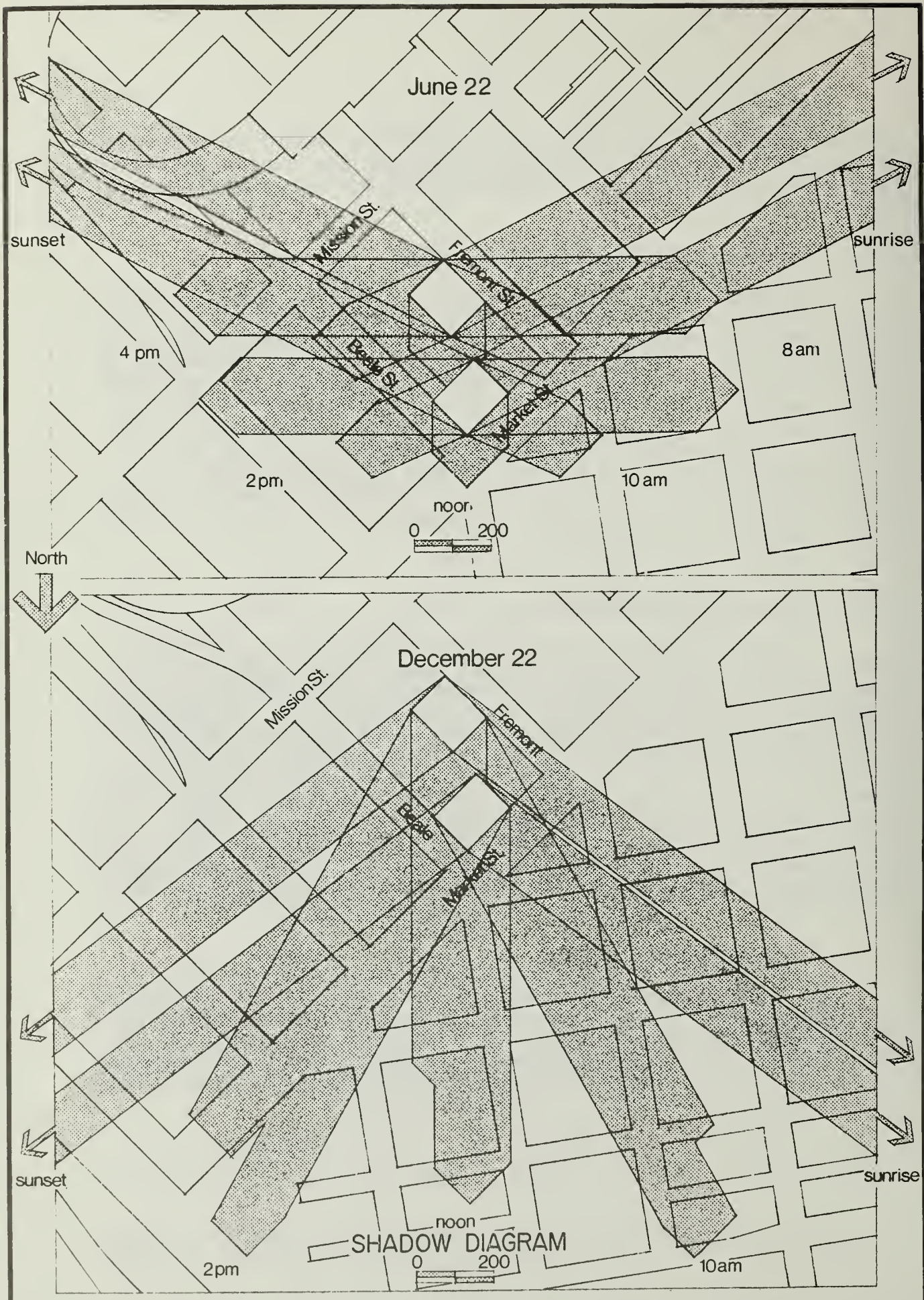

June 22
sunset
sunrise
Mission St.
Fremont St.
Beale St.
Market St.
4 pm
8 am
2pm
10 am
noon
0
200
North
December 22
Mission St.
Fremont
Beale
Market St.
sunset
sunrise
noon
SHADOW DIAGRAM
0
200
2pm
10am

PLATE 19

Equipment	Noise Levels At 50 Feet From Observer(dBA)*
Pile Driver	97
Truck	91
Scraper	88
Jack Hammer	88
Crane	88
Concrete Mixer	85

Source: Noise from Construction Equipment and Operations, NTID 300.1, December 1971.

It is likely that improvement will be required in some of this equipment before 1977 in order to meet the City's phased noise level standards.** (80 dBA or less @ 100 feet).

As a basis of comparison for these noise levels--normal conversation levels range from about 43 to 57 dBA; the noise level 50 feet from an automobile traveling at 50 miles per hour ranges from 62 to 85 dBA.

Although noticeable noise and vibration levels are anticipated during construction due to the heavy equipment required, levels would be decreased following construction activities, and are expected to be compatible with and similar to other commercial/office areas. Following the completion of construction, the greatest noise and vibration levels in the area would be generated from traffic on Mission and Market Streets. The increase attributable to this project would not be noticeable.

The proposed site is within in a general area designated by the Transportation Noise Section of the Environmental Protection Element of the Comprehensive Plan as one where new construction should be undertaken only after a detailed analysis of the noise reduction requirements is made, and needed noise insulation features included in the design. Such a detailed analysis was made (Appendix C) which shows that a design level of 65 to 70 dBA should be used at the proposed building locations. Normal building construction techniques will generally

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* A standard scale of sound level measurement which takes into account the relative response of normal human hearing to sounds over the entire audible range of frequencies and at a total sound level characteristic of urban areas.

**City and County of San Francisco Noise Ordinance.

suffice for this except for any acoustically critical spaces in lower floors. Light frame structures provide reduction of 20 decibels and masonry structures provide a reduction of 25 decibels.*

5. Construction Hazards

Hazards during the project construction are expected to be typical of those generally associated with construction of this type; e.g., accidental utility breakage or rupture, bulkhead failure or traffic accidents due to trucks, etc.

Soil pressures against the perimeter bracing would be affected by a major earthquake during construction. The foundation investigation report will recommend that shoring members be designed to allow for uncertainties in loading, including potential earthquake loading.

6. Earthquake Hazard

The project buildings are being designed by application of two distinct analytical techniques:

1. Static analysis in accordance with the requirements of the San Francisco Building Code, wherein the earthquake force and building response are treated as though static and time-independent.

2. Dynamic response spectrum analysis to test the behavior of the building when subjected to earthquake forces exceeding those stipulated by code. This technique takes into account the time-dependent, dynamic nature of the seismic forces and the dynamic response of the building to these forces.

The buildings would be designed to be more resistant to earthquake forces than required by the Building Code.

* Federal Highway Administration Policy and Procedure Memorandum 90-2, reported in Transportation Noise Section of the Environmental Protection Element of the Comprehensive Plan of San Francisco adopted September 9, 1974.

IV. ANY ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED IF THE PROPOSAL IS IMPLEMENTED

Demolition and construction would create noise, vibration and traffic congestion. Some dust and other pollutants would be added to ambient air.

Probability of accidents to motorists and pedestrians would be increased during construction.

The project would cause wind velocities to be increased during winter storms, thereby decreasing pedestrian comfort at certain locations within the project's plaza and adjacent streets. The buildings would block some views and cast shadows which would decrease comfort at certain times in certain areas.

The estimated added daytime population of 7400 persons would increase traffic congestion during peak hours, and would increase the load on transit and parking facilities.

Other increases associated with the additional downtown population are as follows:

1. Carbon monoxide, nitrogen oxides and hydrocarbons added to the atmosphere from increased automobile traffic, and gas heating.

2. Energy consumption, both natural gas and electric power.

3. Requirements for police services, especially for traffic control.

4. Water usage and sewage discharge.

5. Solid waste.

Approximately 250 persons would be displaced. Two hundred of these are Bechtel employees, to be located in other facilities during construction, who would return to the project when completed.

V. MEASURES PROPOSED TO MINIMIZE IMPACT

Alterations To Existing Conditions	Measures To Minimize Impact
Increased sewage quantities would go to North Point Water Pollution Control Plant, which presently does not meet quality standards of effluent discharge.	Implementation of the Master Plan for Waste Water Management of the City would result in a level of treatment which would meet the requirements of the Regional Water Quality Control Board.
Energy usage would be increased by the project.	Lighting intensity throughout will be designed to provide minimum intensity compatible with functional purposes. Design of the buildings includes the following: 1. Multiple switching and automatic control of lighting to minimize electrical load. 2. An economizer cycle to optimize the use of outside air for cooling. 3. A variable air volume system, to reduce the amount of air being treated. 4. Recirculation of interior air. 5. A tempered water system which eliminates the wasteful use of energy of hot water systems. Use of a heat pump* is being evaluated by the design engineers.
The project would be visible from the streets and neighboring buildings.	The proposed building heights are less than the allowable limits, and the buildings are designed to be compatible with surrounding structures. The buildings would be located so as to offer landscaped "view corridors" into the block. The building masses would be separated by the landscaped areas.

*A system which provides either cooling or heating depending upon direction of flow of the compressible refrigerant.

Addition of 1-1/3 million square feet of office and commercial space.	Project development would partially satisfy a demand for employment in the downtown area, at a site served by public transportation. Number of parking spaces would be reduced, thereby possibly stimulating increased usage of public transportation.
Wind velocity would increase at pedestrian level.	Design details of pedestrian facilities would be developed to reduce effect and to provide for pedestrian comfort.
Noisy location.	Normal wall construction would attenuate sound to a level consistent with almost all office uses. Acoustically critical areas would be acoustically insulated.
Noise generation by building equipment.	Major noise producing mechanical equipment would be located on the 25th floor and in the basement, and mounted on heavy bases and isolation springs. The cooling tower would be located at the roof level, enclosed within the penthouse, and would have a heavy base and isolation springs. Duct work at the 25th floor would be designed and equipped so as to attenuate equipment noise and minimize its transfer to other areas.
Noise generation by construction equipment.	Contractors would be legally bound to comply with City's noise ordinance.
Articles of historic interest may be excavated.	The project manager would cooperate with appropriate authorities to preserve, protect and remove all archaeological or historical discoveries found within the excavated space. The contractors would be legally bound to immediately notify Bechtel if such discoveries were made. Bechtel would in turn notify the authorities.
Dust generation by construction activities.	Construction roads would be paved, oiled or wet down during use. Traffic would be restricted to roadways. Areas to be graded would be wet down. Trucks loaded with dry materials would be covered or wet down. Local roadways would be kept free of wheel mud and load spillage.

Site is in an area of possible liquefaction as defined in the Blume Report and is in a special geological study area.	Recommendations resulting from the soils and foundation study would be implemented to minimize adverse effects from earthquakes. The soils investigation would be conducted in compliance with the Community Safety Plan of the Comprehensive Plan of San Francisco adopted 9/12/74.
Excavation hazard during possible earthquake.	Shoring recommended by soils consultant would be used to prevent cave-in.
Potential conflict between construction vehicles and MUNI streetcars.	Construction traffic would be directed as much as possible away from Fremont Street.
Construction barriers would cause increased traffic congestion.	No mitigation measure proposed.
Increased crowding around project site.	Plazas on site would be open to the public.

VI. ALTERNATIVES TO THE PROPOSED PROJECT

1. One alternative would be no project. The effects of no development would be that existing older structures would continue in use, eventually deteriorating.* Stimulus for continuation of current intensification of development of the surrounding area would be decreased. Impacts due to greater density and building scale would not occur.

2. A second alternative would be a hotel. Effects of this alternative would be similar to those described for the proposed project, except that peak hour traffic congestion would be somewhat less. Early plans included a hotel on the site, but a review by Bechtel**indicated that hotel rooms in San Francisco are currently overbuilt and that this would not be feasible.

3. A third alternative would be retail buildings of lesser height. Effects would be similar to those of the proposed project except for those associated with building height. Wind effects would probably be less. This area is not presently a prime retail location, but as the daytime population increases, there would be a demand for small retail and service facilities. The project as proposed has provisions for such functions, but not for a large retail facility.

4. A fourth alternative would be residential development. Effects would be similar to those of the proposed project except that traffic congestion might be less. There are presently no high quality residential developments in the immediate area, and Bechtel sees no evidence of any significant demand for such development at the present time.

5. A fifth alternative would be an alternate height design. The developer's requirements for this project are to provide space in each building for a maximum number of people at the most favorable construction cost. The greatest impact on the project costs is reflected in structural steel and foundation costs. Soil conditions limit the weight (and correspondingly the height) of the project to the proposed limits as the maximum that can be supported on "short" piles. Six-hundred-foot high buildings could be constructed within the code height limits at this site, but the construction cost would be adversely affected. A decrease in height would require substantially the same piling system as in the existing design, but would yield less space within the building for the same general foundation and structural steel cost parameters.

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* Since preparation of the draft EIR, the buildings at the corner of Market and Beale have been demolished. This site would likely be used as a parking lot, subject to approval of a Conditional Use Permit.

** Bechtel management decision, 1970.

6. Other design alternatives such as buildings of two different sizes or buildings covering a smaller area would be less than optimum from the standpoint of construction cost per square foot of usable floor space.

PHASING ALTERNATIVES

Phasing of construction would depend on economic considerations, site availability and demand for office space. Phasing alternatives are discussed below.

1. The proposed phasing consists of constructing the Bechtel II Building on Fremont Street, with the retail building on Beale Street and the investment building to follow at a later date. Demolition at the Market-Beale site would proceed as described on page 28 to clear the site of the existing vacant buildings. During the interim period the site of the proposed investment building might be used as a parking lot for approximately 75 cars, subject to authorization for conditional use. Such a lot would be landscaped and screened from Market and Beale Streets according to any conditions required. The area of this parking lot plus the existing 100 car underground parking garage would be approximately 41,000 square feet. This is less than the 91,000 square feet maximum permissible for the existing Bechtel Building at 50 Beale Street and the proposed Bechtel II Building.

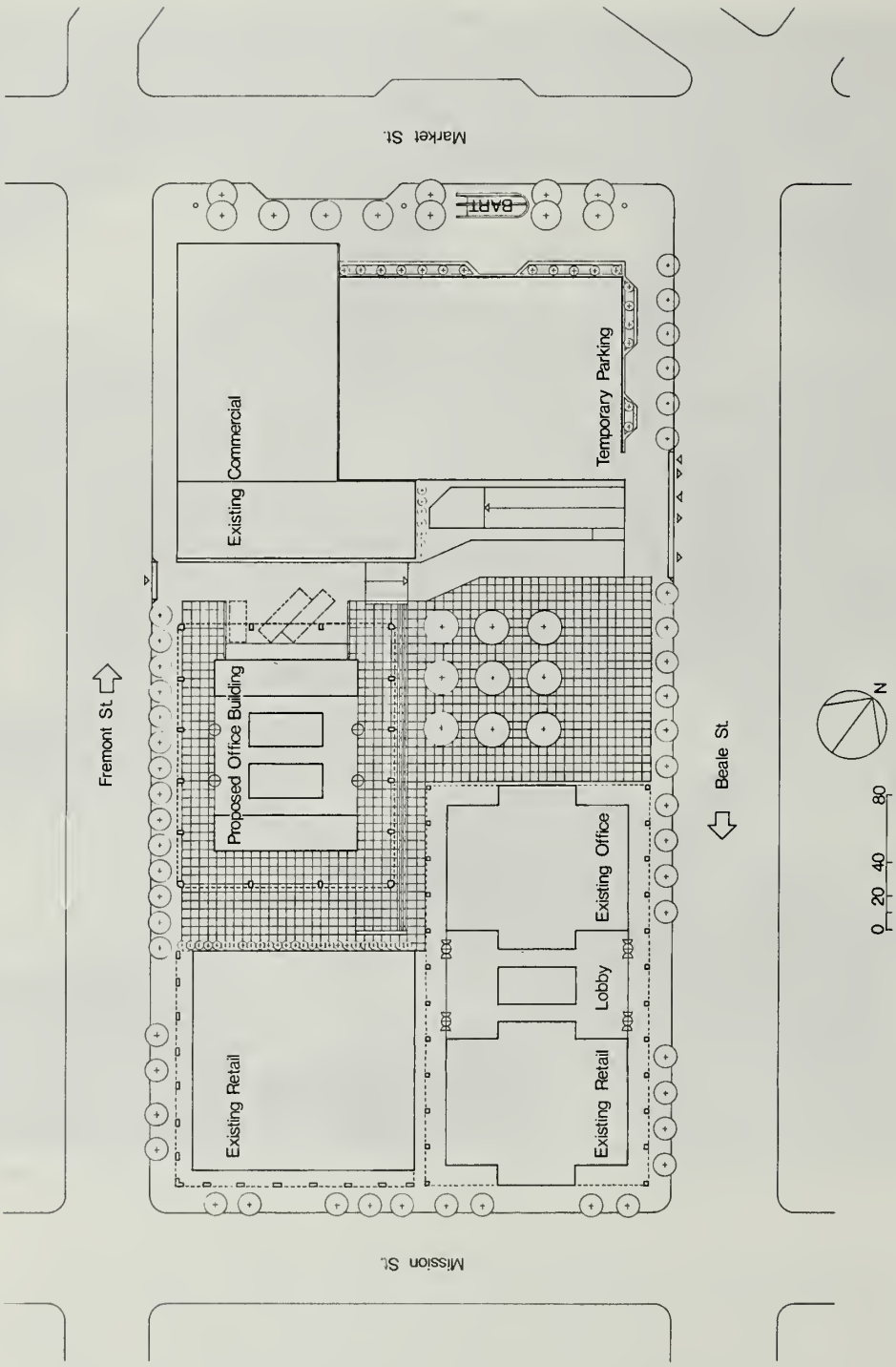
The underground garage facing Beale Street would remain, and the landscaped area would be provided within the block. A photograph of the model showing this alternative is shown in Plate 20. The site plan is Plate 21.

The ultimate impact of this phasing would be essentially as described in Section III, except that an additional period of construction impact would be experienced when the investment building is constructed. The impact during the interim period, on downtown population, traffic and transportation, services and utilities and public revenues would be approximately one-half that of the total project. The impact on pedestrian comfort due to increased wind velocities would be the same or less than that with both towers, except that during a North wind the protection provided by the building at 345 Market Street would not exist. Some increase in discomfort could be expected in this case. (see Appendix D.)

2. Another alternative phasing that was considered is shown in Plate 22. This alternative would be to demolish the buildings at 345 Market Street, and construct a modified Bechtel Building on that site. Design of this building would be subject to the Market Street Discretionary Review Policy stated in City Planning Commission, Resolution No. 6111, which established a policy for reviewing the design of buildings along Market Street, from the Embarcadero to the Central Freeway, to insure that buildings designed in this area are compatible with an enhance the public improvements. The site at 45 and 49 Fremont Street would remain in its present use.

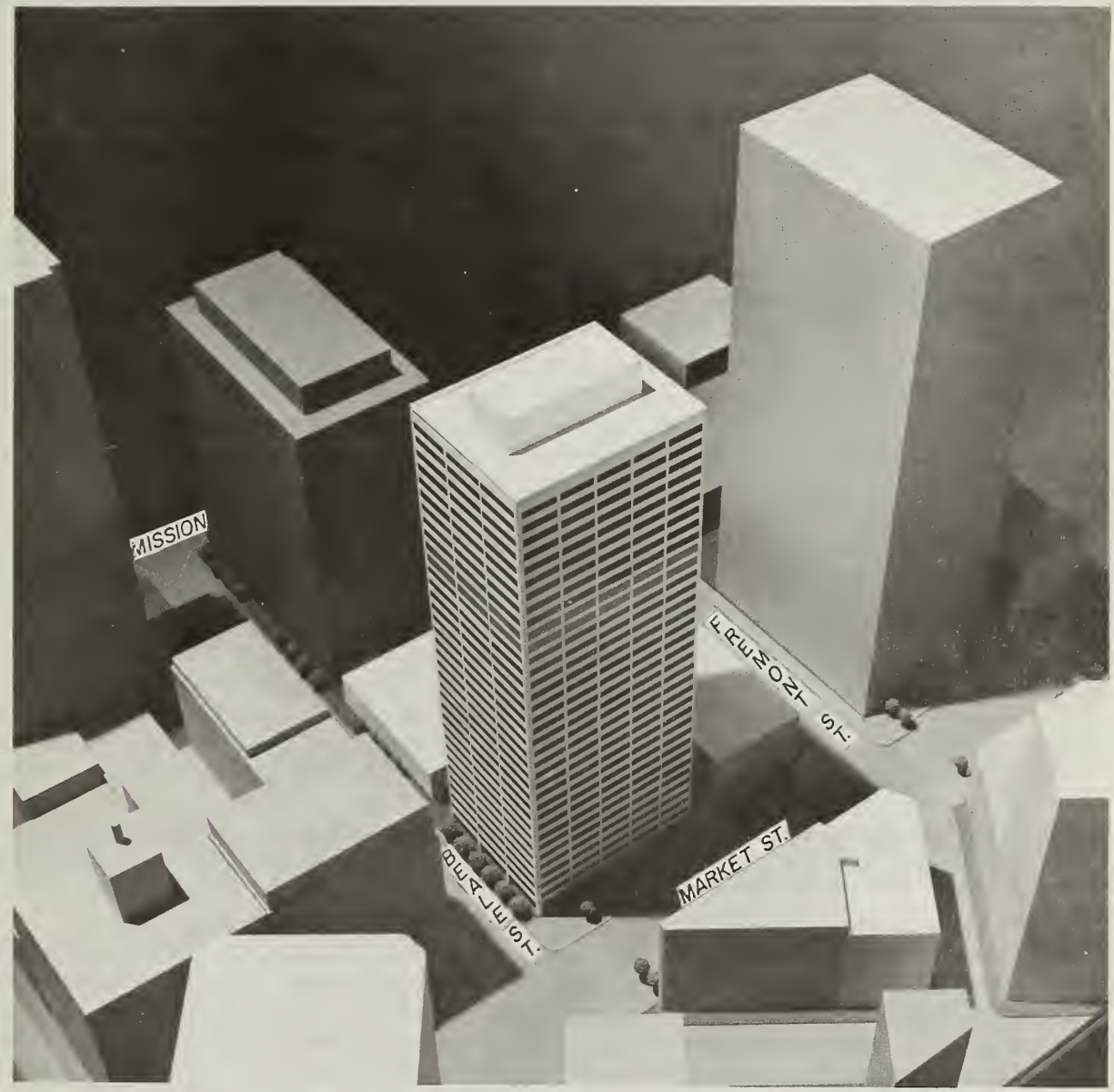
PHASING ALTERNATIVE I

PLATE 20



SITE PLAN
FOR FIRST PHASING ALTERNATIVE

PLATE 21



PHASING ALTERNATIVE II

PLATE 22

Plans for future development would remain open. Impact of this alternative would be approximately one-half the impact described for the proposed project with respect to downtown population, traffic and transportation, services and utilities, and public revenues. The impact on pedestrian comfort, due to increased wind velocities, would be somewhat less than if both towers were constructed. An exception to this might occur south of the building a small fraction of the time. (See Appendix C.) This alternative is no longer being considered by the developers.

VII. THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The long-term effect of the project would be the stimulation of further development. This would mean increased employment opportunities, more commercial areas and greater tax revenues, and would provide more intense use of the area. With the increased employment provided in an area served by public transportation, the overall result may be that of less dependence upon the automobile for downtown circulation and commuter travel.

The project would preclude future choices for use of the two building sites.

The reason for undertaking the project now is that it is currently considered financially feasible by the developer.

VIII. ANY IRREVERSIBLE ENVIRONMENTAL CHANGES WHICH WOULD BE INVOLVED IN THE PROPOSED ACTION SHOULD IT BE IMPLEMENTED

Non-renewable energy and material resources would be expended during the project construction phase in the construction of the buildings. The project represents a commitment for additional office space usage within the city. Although not physically irreversible, the changes that would result from the increased daytime population should be considered irreversible in a social sense. The increased energy usage for building operation, traffic congestion and emission of air pollutants would continue. Even if the magnitudes should be reduced by technological change a contribution from this project would persist.

Effect of the buildings on air currents could be reduced by future projects of other developers. This, again, does not reverse the change but modifies and/or reduces the effects.

IX. GROWTH-INDUCING IMPACT OF THE PROPOSED ACTION

The project would increase the area's daytime population from approximately 4,350 to 12,000 persons. It would be serving the existing population to a great degree but is intended to attract and to serve additional commuter population, thus providing for future population growth.

As discussed in Section III.F., most of the new population would be drawn from within the downtown area. The degree to which the new population would involve persons not presently working in San Francisco cannot be estimated due to the impossibility of predicting the source of new tenants. It is impossible to predict the extent or rapidity with which the offices vacated for relocation to the subject project would be reoccupied, but it is reasonable to assume that at least 50 percent would eventually be reoccupied. On this basis, the population increase in the downtown area would consist of the unknown number of persons coming into the project site from outside the area plus approximately 2,700 persons that would occupy offices vacated as a result of the project.

Assuming an average expenditure of five or more dollars* per week for meals, local purchases and services, a daytime population of 7600 new persons would spend more than two million dollars per year. The increased purchasing power in the area could lead to the establishment of small shops and facilities that, in turn, would generate additional demands for goods and services, thus inducing further growth. The increase in population would probably be primarily daytime rather than residential population. Parking facilities would become more crowded. The shops attracted to this area would serve the local business community, and would probably attract few shoppers from other areas.

The project is expected to have a growth-inducing impact upon the downtown area of San Francisco south of Market Street. Through bringing new development to this section, which now has little population and is somewhat deteriorated, a stimulus could be provided for further renovation in adjacent areas.

The new developments that can be expected in this section of the City would tend to replace low overhead shops and services with new shops and restaurants with higher overhead and higher prices. There could also be a trend toward reduction of retail space along with the increased user population. This would provide additional pressure toward increased prices.

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*This is a conservative estimate. The actual amount would probably be larger, and the multiplier effect would result in even larger expenditures. That is, some of the shop owners, and employees, serving the new population would also spend money in the area.

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APPENDIX A

UTILITIES AND SERVICES IN THE BEALE MARKET AREA

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UTILITIES AND SERVICES IN THE BEALE MARKET AREA

Discusssions with personnel of the City and County of San Francisco and the public utilities serving the project area indicate that basic system capacities would be adequate for the proposed project and that utility connections could be made routinely in coordination with the construction schedule described in this EIR. The following paragraphs give the information gained from these communications.

San Francisco Water Department

Mr. Cy Wentworth of the City Distribution Division has provided the following information:*

"The San Francisco Water Department can supply adequate water for all normal domestic and fire demands to the above location. There is a 12" main in Beale Street and 6" main in Fremont Street which are available for service supply. We will not give service from our Market Street mains.

Sizing of domestic water services is the responsibility of the San Francisco Water Department. We must have a complete list of fixtures before we can process an application for service. This list should indicate either public or private usage and whether tank or flushometer type fixtures.

The size of the fire service must be approved by the Bureau of Building Inspection located at 450 McAllister Street."

The developer plans to provide the details required when applying for service, and when size of fire service is established, plans to request approval from the Bureau of Building Inspection.

San Francisco Fire Department

Chief Gautier of Planning and Research has stated that Engine Co. 13 at 115 Drumm Street, soon to be moved to the corner of Sansome and Washington Streets, would provide fire protection services at the project site. No additions of equipment or personnel would be required. Mr. Gilbert Bendix, superintendent of the Bureau of Water Supply, states that reliable water supply is available in that block. A

*Letter to Dames & Moore from San Francisco Water Department, November 11, 1974.

detailed description of this system, which is designed and built to withstand earthquakes, is given in "Fire Department Has Own Water Supply System" by Anthony J. Rando and Gilbert G. Bendix, Public Works, November 1968.

San Francisco Police Department

Officer Robert Bernardini of Planning and Research reports that the general area including the project site generated 163 incidents (reported to the police) during a 12-month period. This is very nearly the same as the average for areas of similar populations within Census Tract 176. His estimate of the increase in cost of police services attributable to the project would be $37,928 per year.

Division of Sanitary Engineering

Mr. M. Francies states that 12-inch mains exist in Beale and Fremont Streets and a 3 x 4-1/2-foot main exists in Mission Street. The sewage is treated at the Northpoint Plant which is being upgraded in accordance with the Wastewater Master Plan referred to in the impact chapter. The proposed project would add 0.1 percent to the present dry weather demand on the system.

Pacific Gas and Electric

Mr. Gerry Tyson is working with the developer in planning the service of gas and electricity to the project site. According to Mr. Tyson, the stated additional requirements that would result from the project are within existing capacities of the gas main and underground cable bordering the site. The connections would present no unusual problems.

Pacific Telephone Company

The building industry consultant, Mr. Torkelson, has been advised by Bechtel of the number of employees that would be added by the project. He states that the underground cable in Mission Street is sufficient for providing the telephone services for that number of employees.

Golden Gate Disposal Company

Mr. Peter Gardella states that office buildings with approximately a million square feet of usable floor space would require one truck to dispose of the five tons of trash picked up daily. His company can provide the service.

Mr. Gardella has estimated that available landfill space will be used up in eight years at the present rate of 2000 tons per day. The project's load of five tons per day would shorten this period by approximately one week.

APPENDIX B

WIND TUNNEL STUDY ON THE PROPOSED
BECHTEL BUILDINGS, MARKET AND
BEALE STREETS, SAN FRANCISCO, CA.

CONDUCTED FOR DAMES & MOORE

BY

ENVIRONMENTAL IMPACT
PLANNING CORPORATION
SAN FRANCISCO, CALIF

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APPENDIX B

WIND TUNNEL STUDY

I. INTRODUCTION

The interaction between the natural wind and structures in an urban area is quite complex. Because of this complexity and the varied characteristics of the wind itself, architects and city planners are unable to determine the effect of a proposed structure on the local wind environment during design and planning with the type of information usually available. This situation can result in adverse wind conditions being created for pedestrians when the structure is built. At this point, remedial measures are usually quite costly to implement, if they exist at all.

Fortunately, modeling of winds around buildings and in cities is possible through use of wind tunnel facilities and capabilities for simulating natural winds. Mean windspeed can be accurately measured for a wide range of meteorological conditions found at a particular site, using a scale model. An advantage of this technique is that it allows evaluation of environmental effects of modifications to the proposed project before the cost of construction has been realized.

Data from wind tunnel tests can be combined with climatological data to quantify the effect of a proposed structure on pedestrians in terms of human comfort. The frequency distribution of wind strengths at pedestrian level, when combined with temperature data and shadow patterns of the proposed structure, can be used to forecast pedestrian comfort near the building in terms of percentage of time that discomfort is experienced.

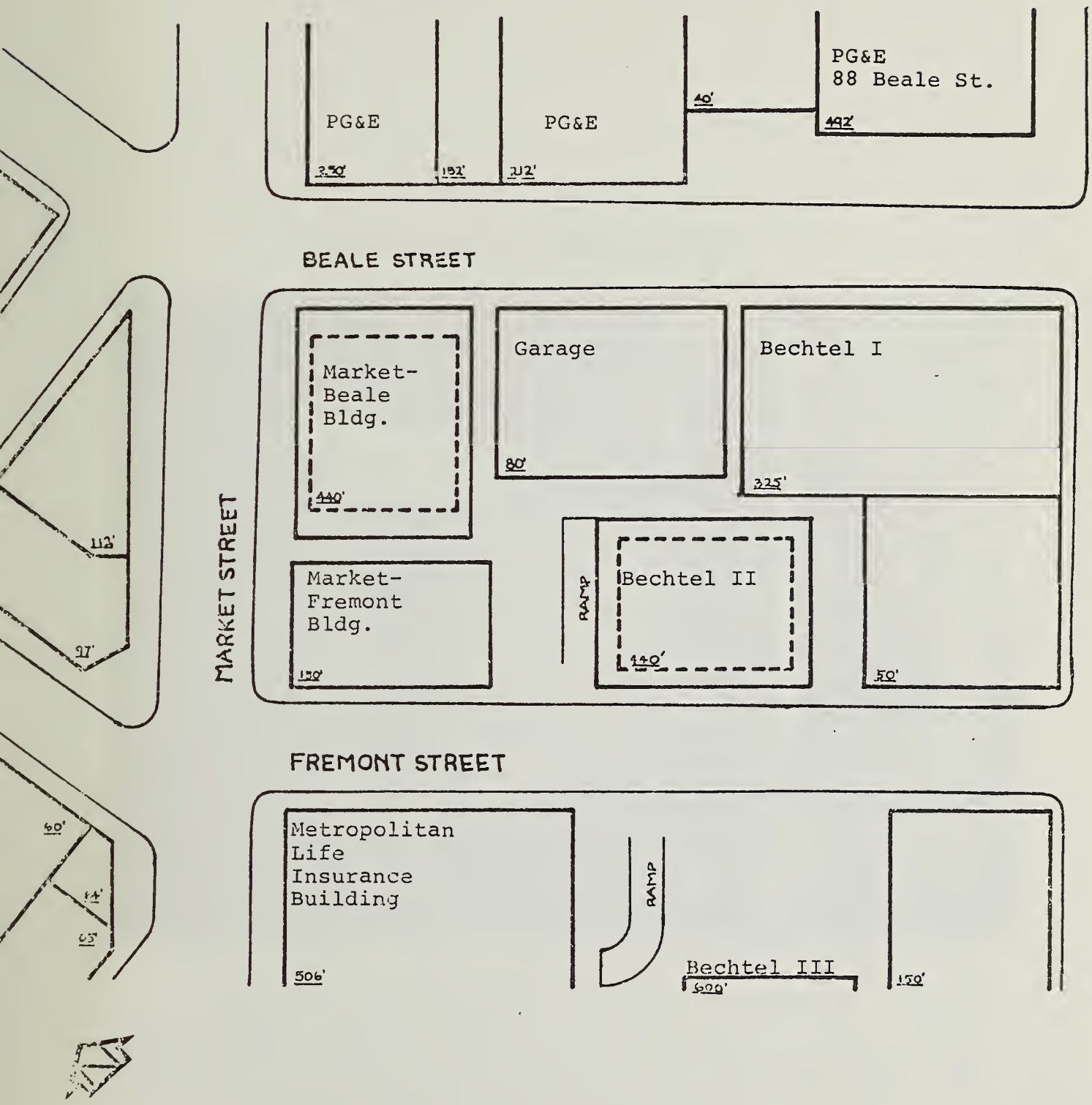
The research was conducted in three phases. In Phase I, the current wind environment of the site was measured. The impact of the wind environment due to construction of the proposed building was then evaluated in Phase II. Finally, the effect of the proposed structures was re-evaluated for future conditions, according to the Bechtel master plan for ultimate use of the surrounding area.

II. SUMMARY

A wind tunnel investigation was carried out on models of the existing site, of the proposed project, and of the proposed project in anticipated future surroundings. The findings show that the project will cause a general increase in wind velocities at pedestrian level on site and in the surrounding streets, and will cause strong wind in certain localized areas. Other areas will be sheltered more than they are at present. The proposed project results were analyzed for their implications for human comfort, providing an index of the probability of discomfort occurring at 1 p.m. during the four seasons. The sheltered areas and problem areas defined by this technique tend to remain the same throughout the year.

The areas found to be most uncomfortable are the two passageways between the Market-Beale Building and the Market-Fremont Building, and the Bechtel II Building and the Bechtel I Building, respectively. (A figure labelling these buildings is found on the following page.) The passageway south of the Market-Beale Building was found to be very windy during north, northwest and south wind conditions. The passageway between Bechtel I and Bechtel II Buildings was windy during southwest, south and southeast wind conditions. Two other uncomfortable areas are the corner of Market Street and Beale Street, and Fremont Street to the east of the Metropolitan Life Insurance Building. The passageway between the Market-Beale Building and the proposed parking garage is found to be very sheltered in all seasons. The plaza to the northwest of the Bechtel II Building is windy on the side facing the Market-Fremont Building, but is sheltered near the parking garage. The plaza to the southeast of the Bechtel II Building is well sheltered.

In general, the high-rise construction anticipated around the project in the next few years will shelter the site and reduce windspeeds at pedestrian level. No marked changes in the flow pattern or strength were found except for the street and plaza in front of the Bechtel III Building, where some strong funneling effects were observed.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506'
RAMP
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150'
112'
27'
60'
44'
65'

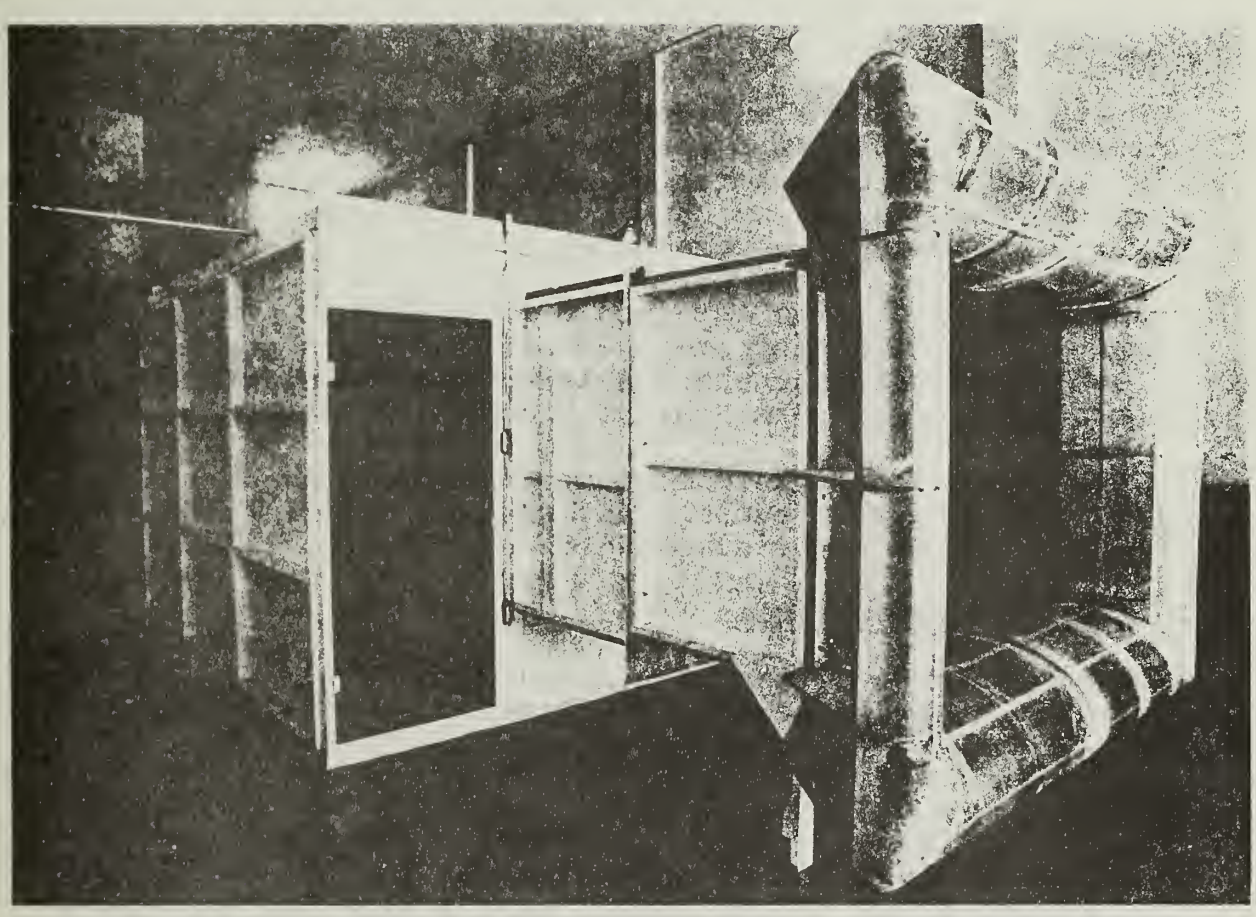
III. BUILDING AND SITE DESCRIPTION

The project site is in downtown San Francisco, bounded by Mission Street, Market Street, Beale Street and Fremont Street. The site is currently occupied by retail-office buildings of 5 to 6 stories, and 3 parking lots.

The project entails construction of two high-rise structures approximately 440 feet in height (the Market-Beale Building and the Bechtel II Building), a parking structure 80 feet in height, and pedestrian areas between the structures. The proposed high-rise structures would be much taller than most of the surrounding buildings, except for the Metropolitan Life Building at Market and Fremont Streets, and the Pacific Gas and Electric Company Building at Beale and Mission Streets.

The area immediately surrounding the site is highly urbanized with many high-rise buildings. The area of high-rise development extends north and south along Market Street, and the Financial District lies northwest of the site. Areas east of the site are less developed, with few tall structures.

This report includes a future site study, in which 6 new high-rise structures were added to the surroundings of the project, indicating the wind conditions which would be expected when these future projects are built. Their names and locations are: Bank of Tokyo, corner of Sansome and California Streets; Standard Oil Building, Market and 2nd Streets; Continental Development Corporation Building, Market and Battery Streets; the Golden Gate Building on Main and Mission Streets; the Southern Pacific Complex Project on Steuart and Spear Streets between Market and Mission; and Bechtel III Building between Market and Mission on Fremont and First. All presently undesigned projects were modelled as being 400 feet in height.



EIP Boundary Layer Wind Tunnel Facility

IV. MODEL AND WIND TUNNEL FACILITIES

Model

A scale model of the proposed building and nearby structures was constructed out of urethane foam, using plans supplied by the architect. A model of the structures surrounding the area was constructed of wood and urethane foam for a distance of several blocks.

The model scale was one inch equals 30 feet. The model of the surrounding city area was built to this scale with building configurations and heights obtained from the Sanborn maps at the San Francisco Planning Department.

The model of the proposed buildings was placed on a turntable in the wind tunnel, allowing the model to be turned to simulate the various wind directions.

Wind Tunnel Facilities

The Environmental Impact Planning Corporation boundary layer wind tunnel was designed specifically for testing architectural models. The working section is 7 feet wide, 14 feet long, and 5 feet high. Wind velocities in the tunnel can be varied from 3.5 mph to 13 mph. The flow characteristics around sharp-edged objects such as architectural models are constant over the entire speed range. Low speeds are used for photographing tracer smoke, high speeds for windspeed measurements.

Simulation of the characteristics of the natural wind is facilitated by a series of adjustable slats, baffles, and perforated screens upwind of the test section. These allow adjustments in wind characteristics to provide for different scale models and varying terrain upwind of the project site.

Measurements of wind speed around the model are made with a hot-wire anemometer. A hot-wire anemometer is a device which relates the cooling effect of the wind on a heated

wire to the actual windspeed. The flow above the city is measured by a Pitot tube connected to a micromanometer. The Pitot tube and micromanometer measure directly the pressure difference between moving and still air. This pressure difference is then related to the actual windspeed. Flow visualization is achieved by use of a smoke generator in conjunction with a 35-mm. camera and a system of photographic spotlights.

V. TESTING METHODOLOGY

Simulation of Flow

The most important factor in assuring similarity between flow around a model in a wind tunnel and flow around the actual building is the structure of the approach flow and geometric similarity between the model and the prototype. A theoretical discussion of the exact criteria for similarity is not included in this paper, but may be found elsewhere (Cermak, 1966, or Cermak and Arya, 1970).

The variation of windspeed with height (wind profile) was adjusted for the scale of the model and the type of terrain upwind of the site by a system of horizontal slats. The profiles used were those generally accepted as adequately describing the flow over that type of terrain (Lloyd, 1967).

Testing Procedure

The wind flow characteristics of the site in its present state were investigated to ascertain the present wind environment. Windspeeds and wind directions at specified points throughout the site were measured and recorded. Wind direction was measured by releasing smoke at each point and recording the direction the smoke traveled. Windspeed measurements were made at the same points, at a scale height of five feet above the ground. A hot-wire anemometer probe is required to make these measurements within a fraction of an inch of the model surfaces. The probe is repeatedly calibrated against the absolute reading of a Pitot tube and micromanometer. Velocity readings close to the model are generally accurate within 10% of the true velocity.

A similar technique was used to measure the wind environment with the proposed buildings in place. Measurements were taken around the buildings and adjacent streets, with emphasis on the corners, and in the plaza areas.

Before and after each test run, a "calibration" measurement was made above the model. The purpose of these measurements was to relate the wind tunnel measurements to actual wind records from U.S. Weather Service wind instrumentation located on the Federal Building at 50 Fulton Street.

VI. TEST RESULTS AND DISCUSSION

Tests of windspeed and direction were conducted for eight wind directions.

Measured windspeeds have been expressed as fractions of the reference windspeed, corresponding to the actual windspeed at the National Weather Service Measuring Station. Thus, a plotted value of .52 means that the measured windspeed is expected to be 52% of the windspeed recorded by the Weather Service.

Wind direction is indicated by an arrow pointing in the direction of flow. Where wind direction fluctuated, two arrows representing the principal flow directions were plotted.

West Wind

West winds occur between 15% and 40% of the time depending on the season. (In meteorology, a west wind blows from the west.) Westerly and northwesterly winds are the most frequent and strongest winds at all seasons in San Francisco. West winds exceed 13 miles per hour 29% of the time and exceed 25 miles per hour 7% of the time in summer. Wind strengths and frequencies are somewhat lower in spring, fall, and winter.

Figure 1 shows the site currently well sheltered by the large built-up area northwest of Market Street and across Fremont. The major flows are in a southeast direction down Beale and Fremont Streets. There are moderate velocities at the corner of Fremont and Market where the air flows across Market and is forced around the Market-Fremont corner by the Metropolitan Life Insurance Building. A moderately low value of .29 is shown in the eddy zone to leeward of the corners of buildings.

Construction of the proposed buildings is expected to cause little wind acceleration at pedestrian level (see Figure 2). Again the major flows would be down Beale and Fremont Streets. The Market-Beale Building would catch some of the Market Street flow causing moderate winds around the corner and under the overhang. This flow continues down Beale Street with an eddy zone on the northeast side of the Market-Beale Building and the garage.

This flow would pick up velocity with the introduction of the wind flowing between the two 440-foot towers and over the parking garage. From Beale Street it would flow across Mission. The new pedestrian plaza area would be reasonably sheltered with low to moderately low velocities.

Future wind conditions after construction of all planned buildings in the vicinity of the site are shown in Figure 3. Winds on most of the site would not be affected to any large extent, with the exception of the central area of Fremont Street, where increased velocities are found in the vicinity of the new plaza.

Northwest Wind

Northwest winds occur 12% to 39% of the time in San Francisco, depending on the season. Northwest winds are strong, ex-

ceeding 13 miles per hour 35% of the time and 25 miles per hour 3% of the time in summer. As with west winds, frequencies and speeds are lower in spring, fall, and winter.

Winds under present conditions are shown in Figure 4. The site is generally sheltered due to the upwind position of the Financial District. The major flows are toward the southeast, up Beale and Fremont Streets. On Fremont Street the winds reach moderate velocities and flow into the Metropolitan Life Insurance Building Plaza.

Completion of the proposed project would cause winds to increase slightly along Market Street (see Figure 5). The flow along Beale would increase towards Mission Street. Near the proposed structures, moderate winds would be expected in the pedestrian passageways southwest of the Market-Beale Building, east of the structure at the corner of Market and Fremont Streets, and east of the Bechtel II Building. The flow east of the structure at the corner of Market and Fremont Streets would continue across Fremont Street into the Metropolitan Life Insurance Building Plaza and then continue southeast up Fremont.

Completion of future planned structures near the site would not significantly change the major flows. The flow at the east side of the Market-Fremont Building, though reduced at first, would still continue across Fremont and into the Metropolitan Life Insurance Building Plaza and the new Bechtel Plaza. The velocities would increase to 100% of the winds measured at the National Weather Service Office in the Old Federal Building. The winds between Bechtel I and the proposed Bechtel II Building would continue to be moderate.

North Wind

North wind conditions occur less than 5% of the time during all seasons, and are generally light.

Figure 7 shows present wind conditions at the site. The area is relatively exposed to winds from the Bay, but there are tall buildings immediately upwind of the site, with relatively open space beyond. The site is well sheltered, with the exception of Beale Street near Mission Street.

Construction of the proposed project would create a moderate flow in the pedestrian passageway southwest of the Market-

Beale Building, in front of the west corner of Bechtel II and across Fremont into the Metropolitan Life Insurance Building Plaza. This would be joined by a flow from the corner of Fremont and Market. Other pedestrian passageways throughout the proposed site would have low wind velocities, being well sheltered by the proposed buildings. Other winds around the site would not be affected to any significant degree.

Planned future constructions are not expected to change wind speeds greatly (see Figure 9). The major flow into the Metropolitan Life Insurance Building Plaza would remain but would decrease in velocity.

Northeast Wind

Northeast wind conditions occur less than 6% of the time during all seasons, and are generally light.

The site is relatively exposed because of few large buildings upwind and wind flows up Market and Mission streets with few obstructions.

Currently (see Figure 10), winds are moderate at the corner of Beale and Market, Beale and Mission and on Fremont. Elsewhere throughout the site, winds are light.

Completion of the proposed project would decrease winds at the corner of Market and Beale (see Figure 11). The pedestrian areas east and southeast of Bechtel II would have a moderate wind flow. There would also be a moderate wind flow northwest of Bechtel II which would flow across Fremont into the Metropolitan Life Insurance Building Plaza. Other pedestrian areas on the site would be well sheltered with low wind velocities.

Wind patterns under future conditions would be basically unchanged (see Figure 12). The flows around the east corner of Bechtel II and across Fremont would still be moderate.

East Wind

East winds are rare. They occur most often in winter, when they are expected 10% of the time. They are generally light. The site is relatively exposed to winds from the Bay because of the lack of large buildings and the open nature of the parking lots and freeway ramps upwind, though the PG&E buildings do provide some shelter.

Figure 13 shows present wind conditions. The major wind flows are in a northwesterly direction down Beale and Fremont. Beale Street experiences high velocities due to the relatively open space upwind. This flow crosses Market and goes down Pine, as well as down Market.

Wind conditions after completion of the proposed project are shown in Figure 14. The flow down Beale would be decreased somewhat, while the flow down Market would be increased. The remainder of the site would be unaffected, and the plaza would be moderately sheltered, with the exception of the southwest side of the Market-Beale Building, where the winds would be moderate.

Under future conditions (Figure 15), the flow down Beale Street would be increased to the level of existing site conditions and the flow down Market would be decreased. The winds in the pedestrian area on the southwest side of the Market-Beale Building would still be moderate.

Southeast Wind

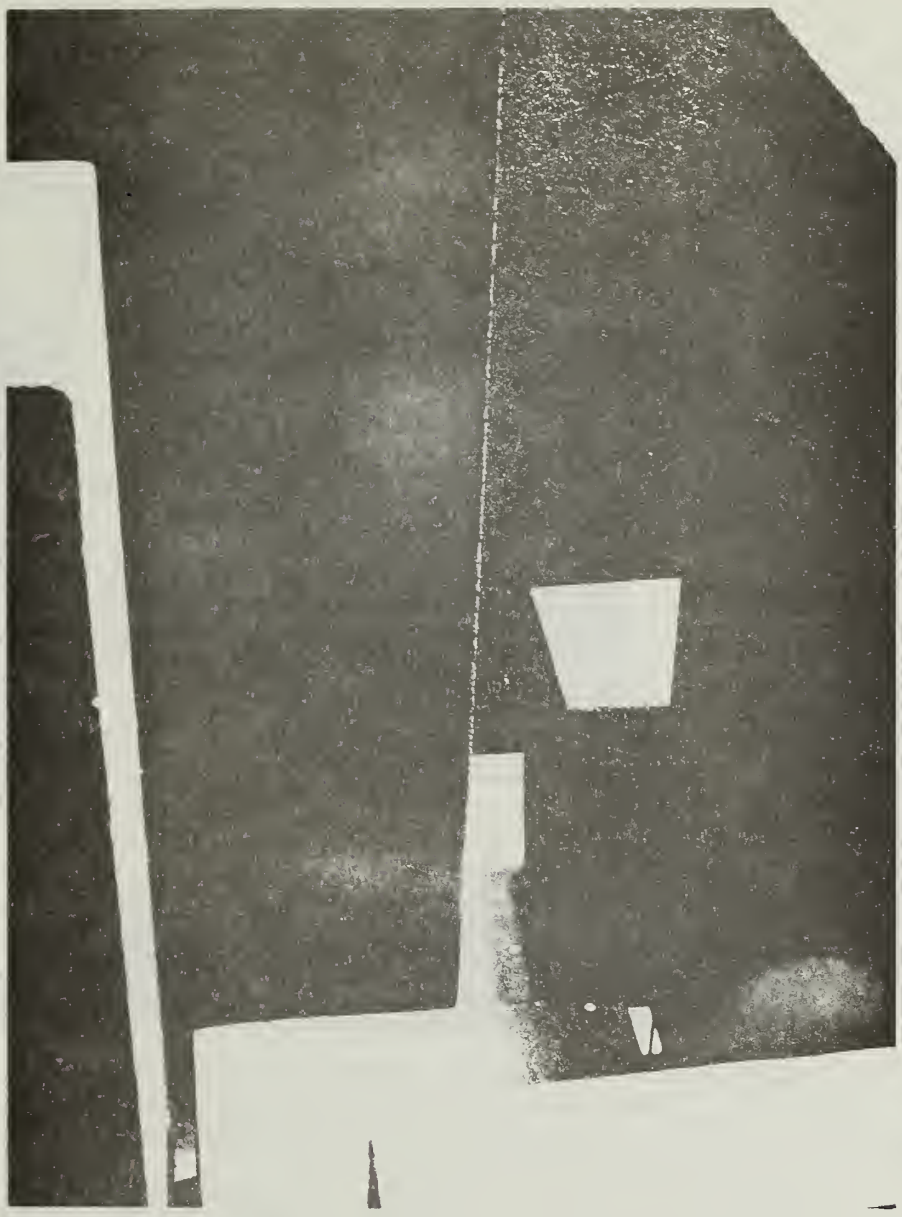
Southeast winds occur less than 3% of the time during the spring and summer, and 6% in fall. They are generally light in these seasons. During winter they can be expected 17% of the time, with speeds over 13 miles per hour occurring 10% of the time.

The site is somewhat exposed to southeast winds from which the 77 Beale Building and the existing Bechtel Building provide some shelter.

Under present conditions, there are moderate to high wind flows toward the northwest down both Beale and Fremont Streets. These flows are primarily caused by having little interference upwind and therefore being free to flow down these streets.

Construction of the proposed project would not affect winds greatly (Figure 17). The flows down Beale and Fremont Streets would still be moderate. The winds in the pedestrian areas between Bechtel I and Bechtel II would be moderate. The flow along Fremont enters the pedestrian area northwest of Bechtel II and then continues down Fremont and across Market.

Planned future structures (Figure 18) are not expected to change wind conditions greatly.



High winds from Southeast being funneled between Bechtel I and Bechtel II.

Smoke testing at corner of Market and Beale.
Winds coming from Southeast direction down Beale,
under the overhang and up Market.

South Wind

South winds are infrequent except during winter storms, when moderate to strong wind is often combined with rain. South winds are expected to occur 12% of the time in the months of December through February, with winds over 13 miles per hour 1% of the time. South winds occur less than 3% of the time during the other seasons and are light.

The site is relatively exposed to south winds due to low buildings and parking lots upwind.

Winds under current conditions are relatively light throughout the site, except for the northeast sidewalk on Fremont Street (Figure 19).

Construction of the proposed project would cause wind flows of high velocities in a northwesterly direction down Beale and Fremont streets (Figure 20). The flow along Fremont Street, in front of the building on the corner of Fremont and Market, would reach and exceed the Weather Service data. The flow would then proceed up Market Street. There would be high winds in the pedestrian areas on the site also. South winds would flow into the site rather freely since no building upwind is over four stories. The wind would then be funneled between the Bechtel I and Bechtel II buildings causing velocities greater than those on top of the old Federal Building. This funneled air flow would continue between the garage and Bechtel II, then between the Market-Beale Building and the Market-Fremont Building and then out onto Market.

Figure 21 shows winds expected after the completion of planned future high-rise structures near the site. No major changes in wind patterns or strengths would be expected.

Southwest Wind

Southwest winds occur an average of 9% annually in San Francisco. Winds are highest in winter, when 25 miles per hour is exceeded 2% of the time.

There is a moderate amount of large scale development to windward of the site, but the east part of the site is relatively more exposed than the west part.

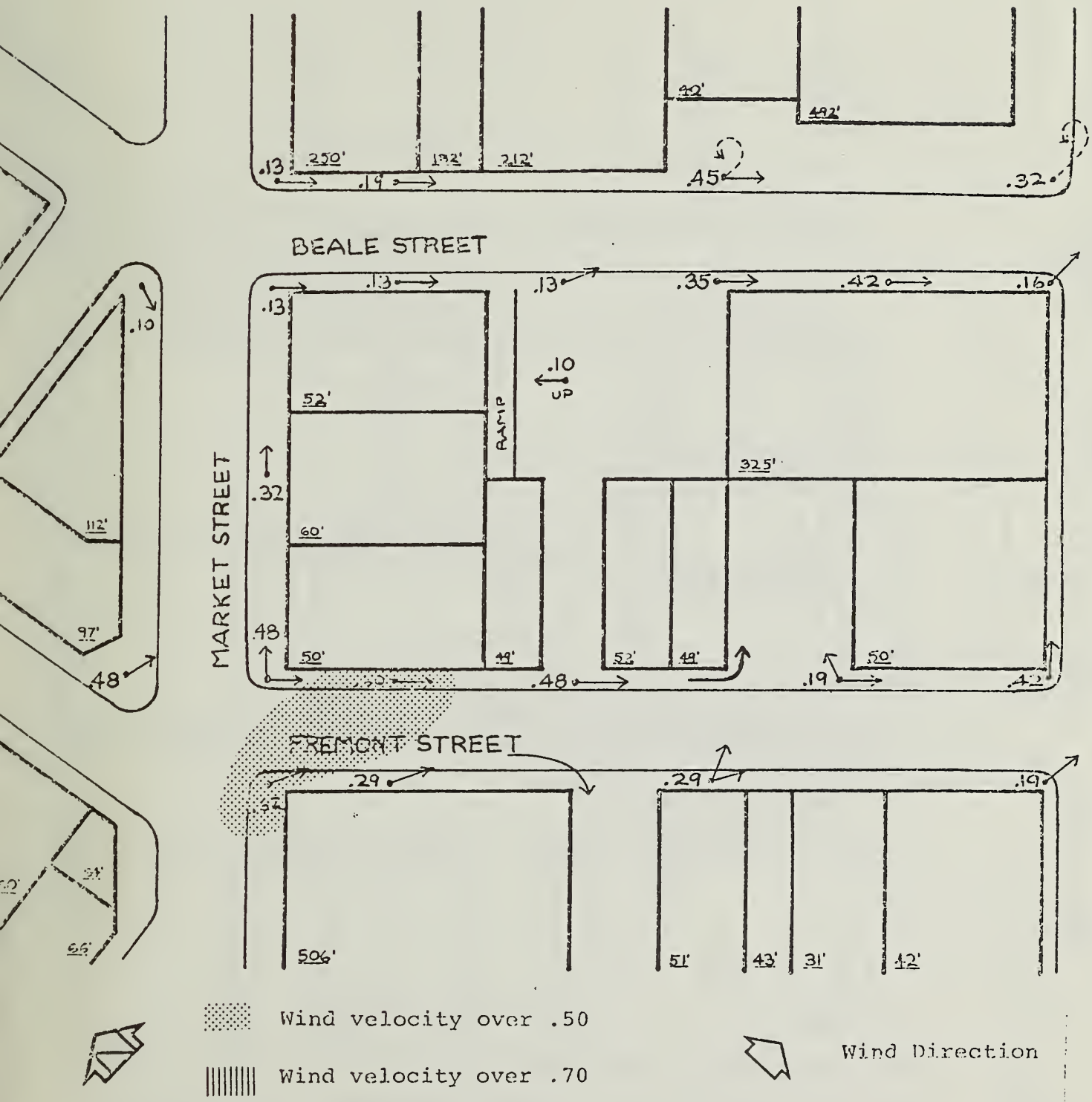
Figure 22 shows that velocities at the present site are generally low, with the highest velocities found on Beale Street

windward of the large buildings there.

Figure 23 shows that construction of the proposed project would deflect flow patterns along Fremont Street near Market Street, causing high velocities in that area.

Southwest winds would be funneled between Bechtel I and Bechtel II, giving rise to high velocities equaling those in the Weather Service data. The wind would also be funneled between Bechtel II and the Market-Fremont Building. Between these buildings and between the Market-Beale Building and the garage, wind velocities would be high.

After completion of future buildings nearby, winds would be decreased throughout the project area (see Figure 24). The major flow would still be down Fremont and up Market but the velocities would be decreased. The pedestrian area between Bechtel I and Bechtel II would still be in the high velocity range.



Wind velocity over .50

Wind velocity over .70

Wind Direction

FIGURE 1 - EXISTING SITE WEST WIND.
Windspeeds are expressed as a fraction of wind recorded by S.F. Weather Station at elevation 132 feet.

WIND TUNNEL STUDY FOR DAMES & MOORE

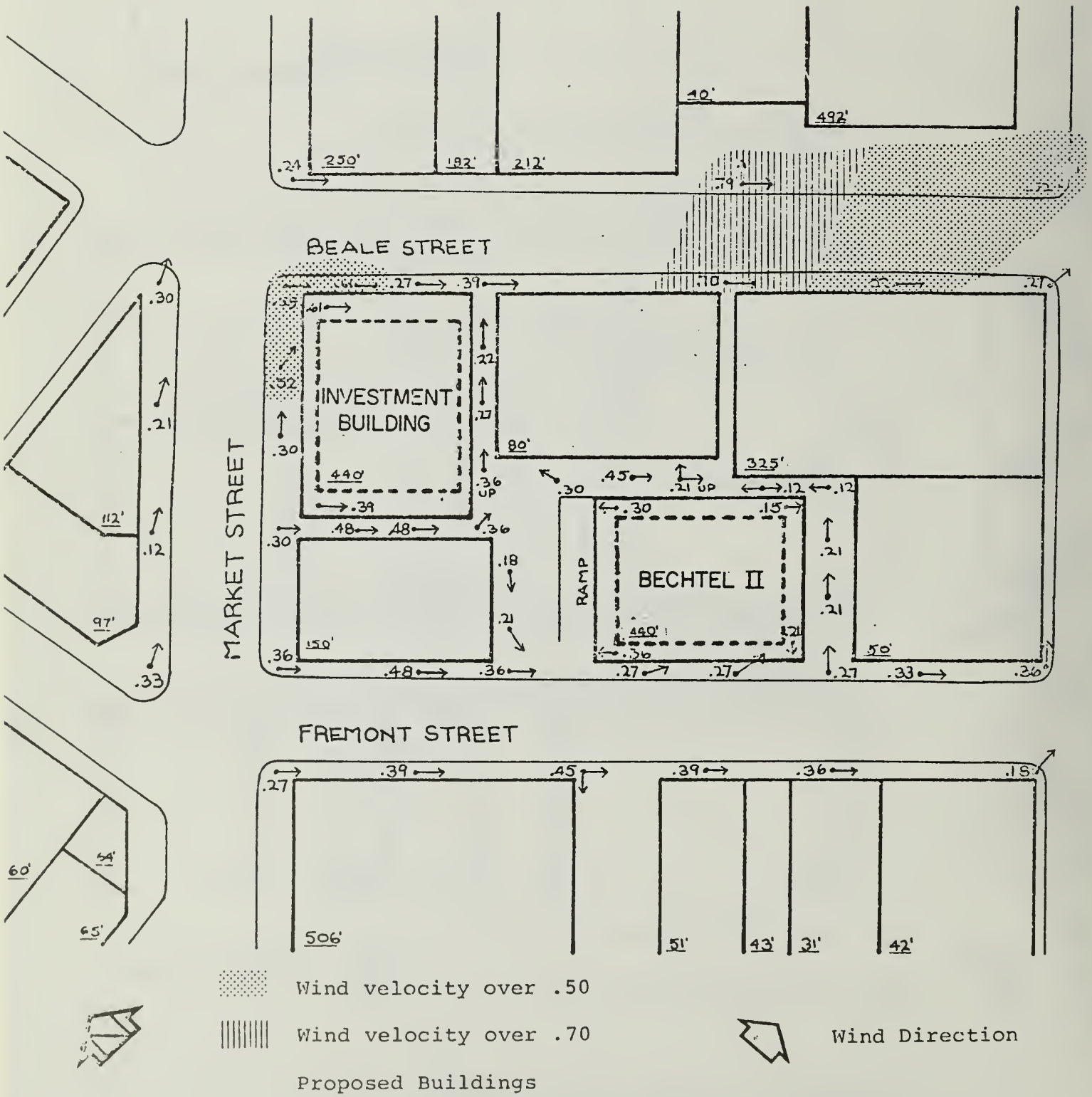


FIGURE 2 - PROPOSED SITE WEST WIND.
Windspeeds are expressed as a fraction of wind recorded by S.F. Weather Station at elevation 132 feet.

WIND TUNNEL STUDY FOR DAMES & MOORE

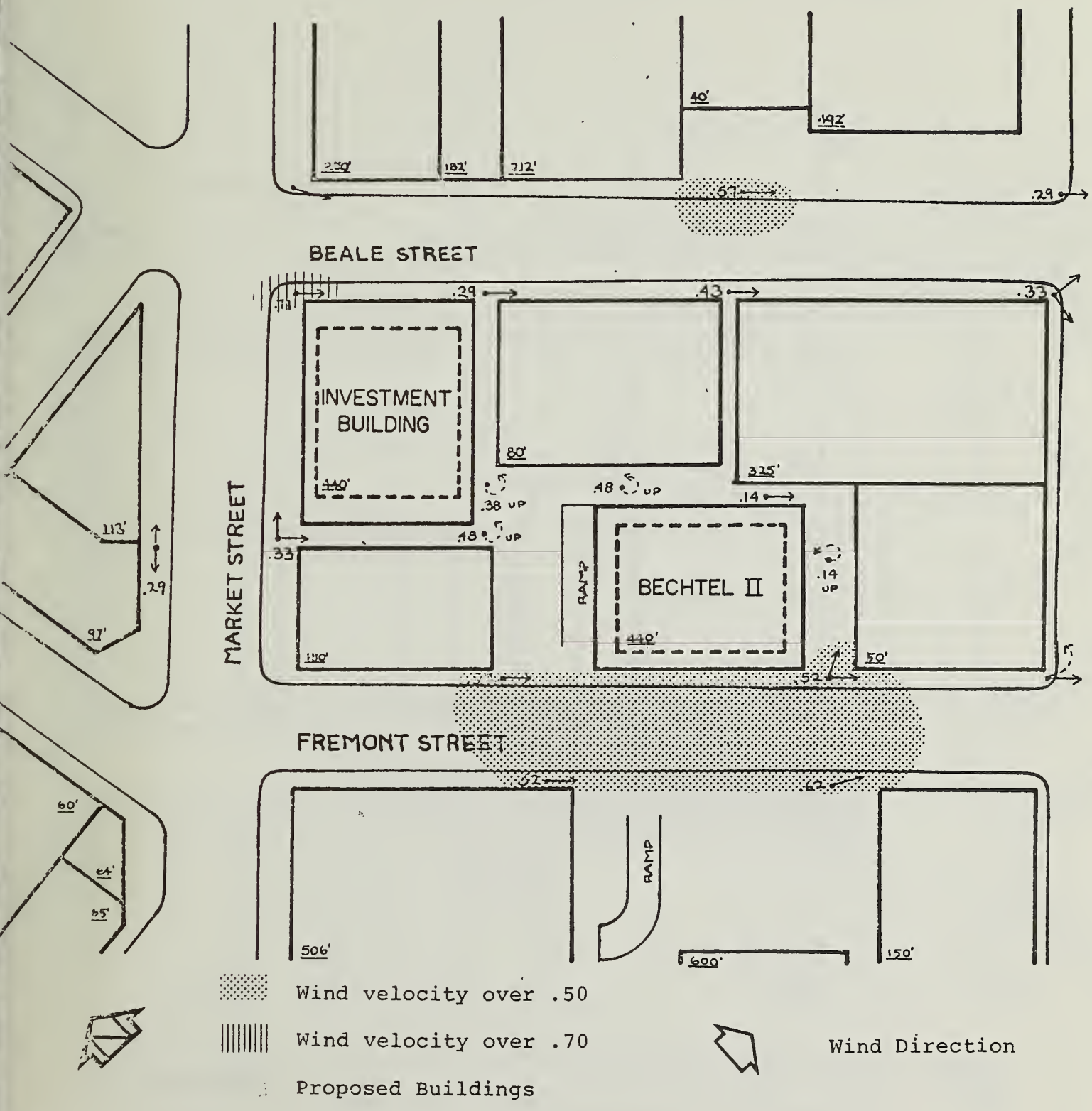


FIGURE 3 - FUTURE SITE WEST WIND.
Windspeeds are expressed as a fraction of wind recorded by S.F. Weather Station at elevation 132 feet.

WIND TUNNEL STUDY FOR DAMES & MOORE

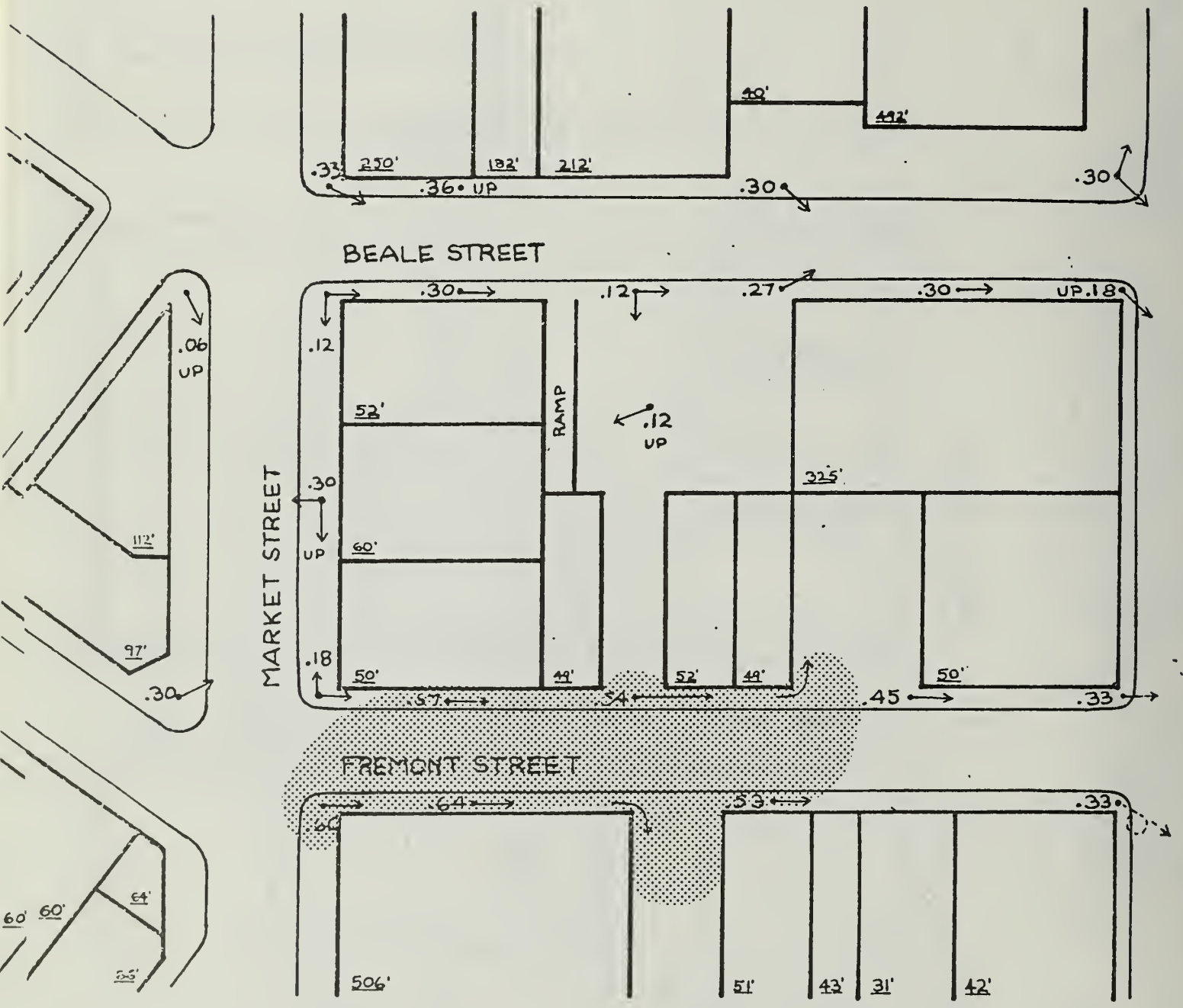


FIGURE 4 - EXISTING SITE NORTHWEST WIND.
Windspeeds are expressed as a fraction of wind recorded by S.F. Weather Station at elevation 132 feet.

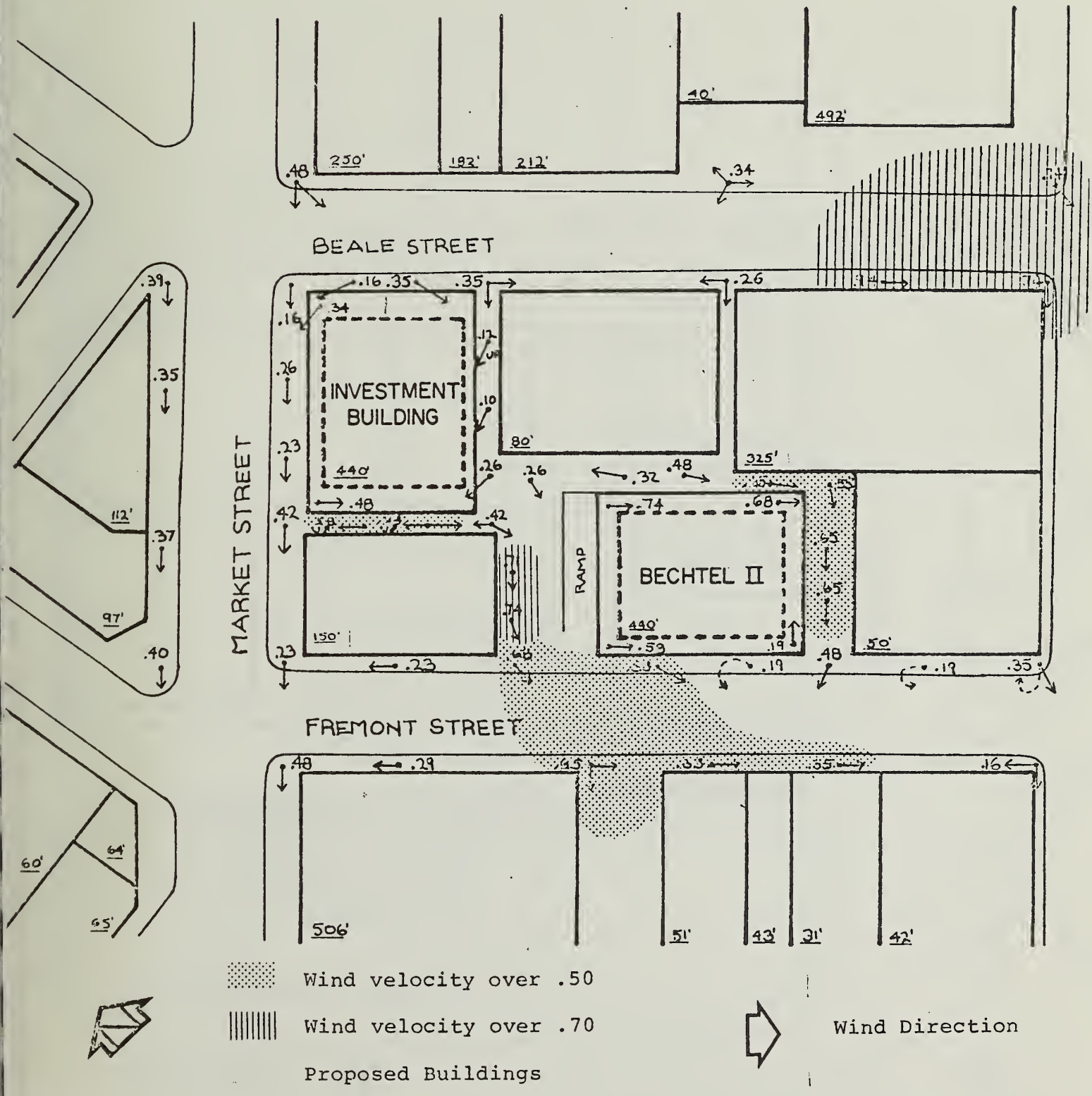


FIGURE 5 - PROPOSED SITE NORTHWEST WIND.
Windspeeds are expressed as a fraction of wind recorded by S.F. Weather Station at elevation 132 feet.

WIND TUNNEL STUDY FOR DAMES & MOORE

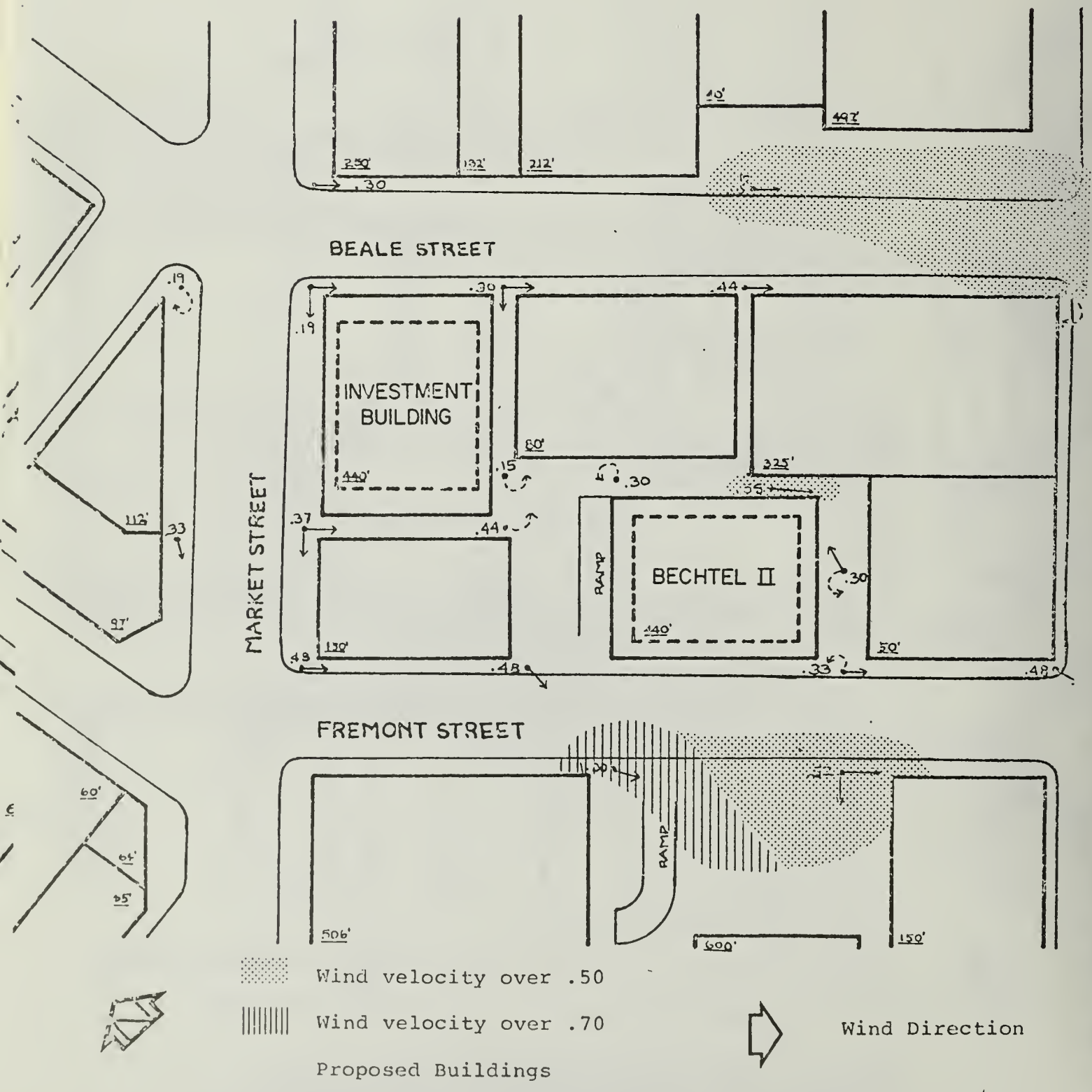


FIGURE 6 - FUTURE SITE NORTHWEST WIND.
Windspeeds are expressed as a fraction of wind recorded by S.F. Weather Station at elevation 132 feet.

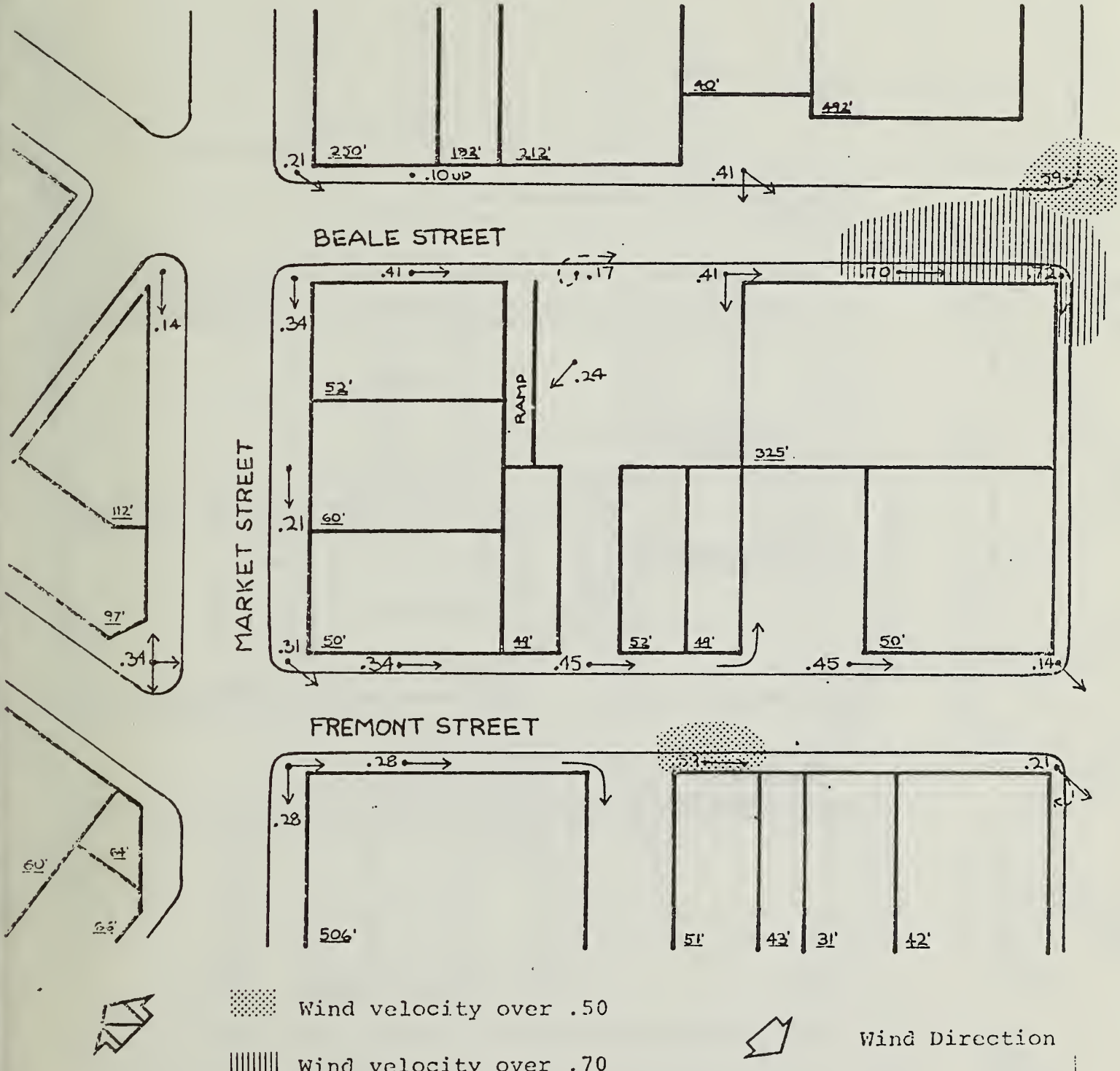


FIGURE 7 - EXISTING SITE NORTH WIND.
Windspeeds are expressed as a fraction of wind recorded by S.F. Weather Station at elevation 132 feet.

WIND TUNNEL STUDY FOR DAMES & MOORE

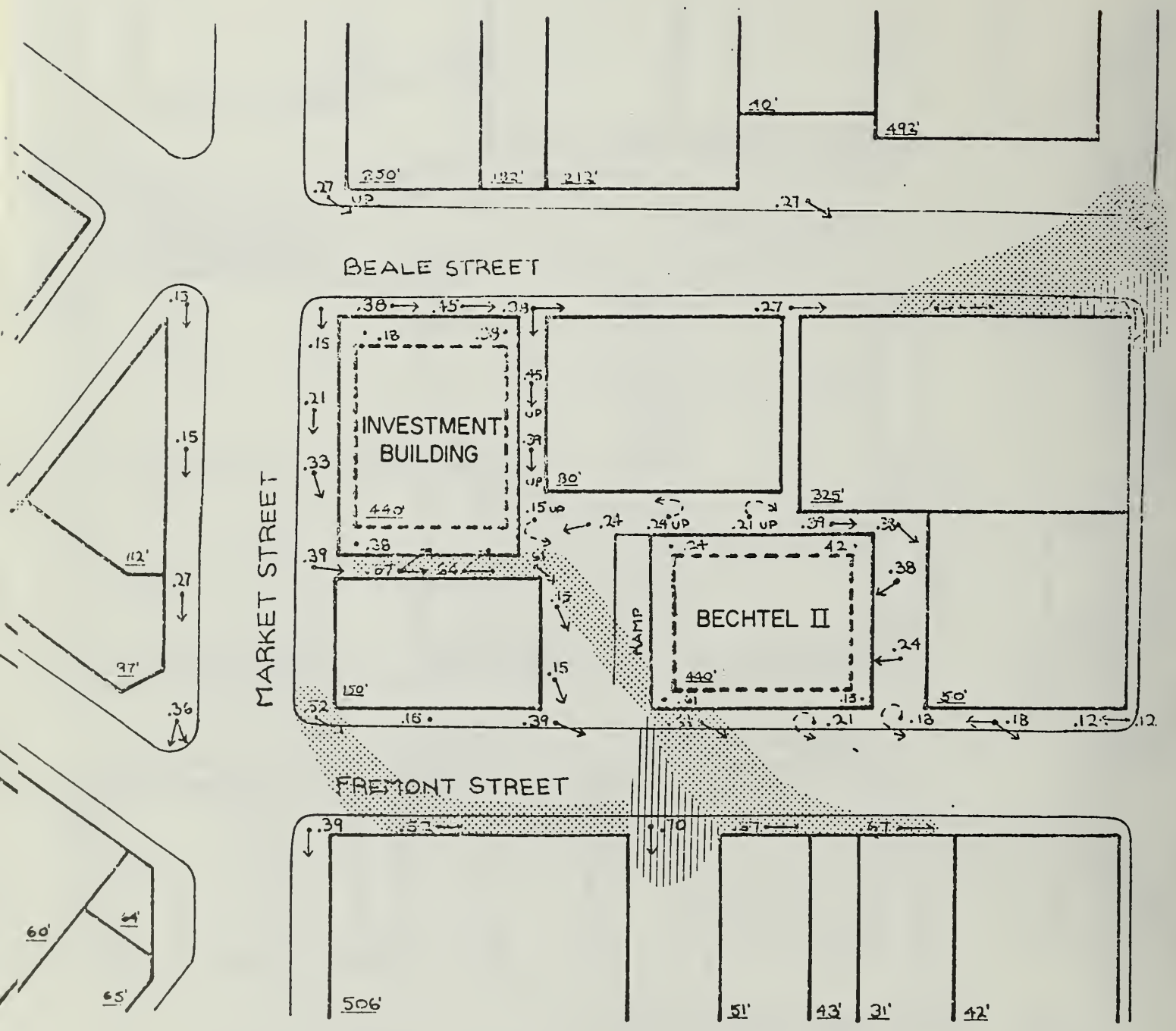


FIGURE 8 - PROPOSED SITE NORTH WIND.
Windspeeds are expressed as a fraction of wind recorded by S.F. Weather Station at elevation 132 feet.

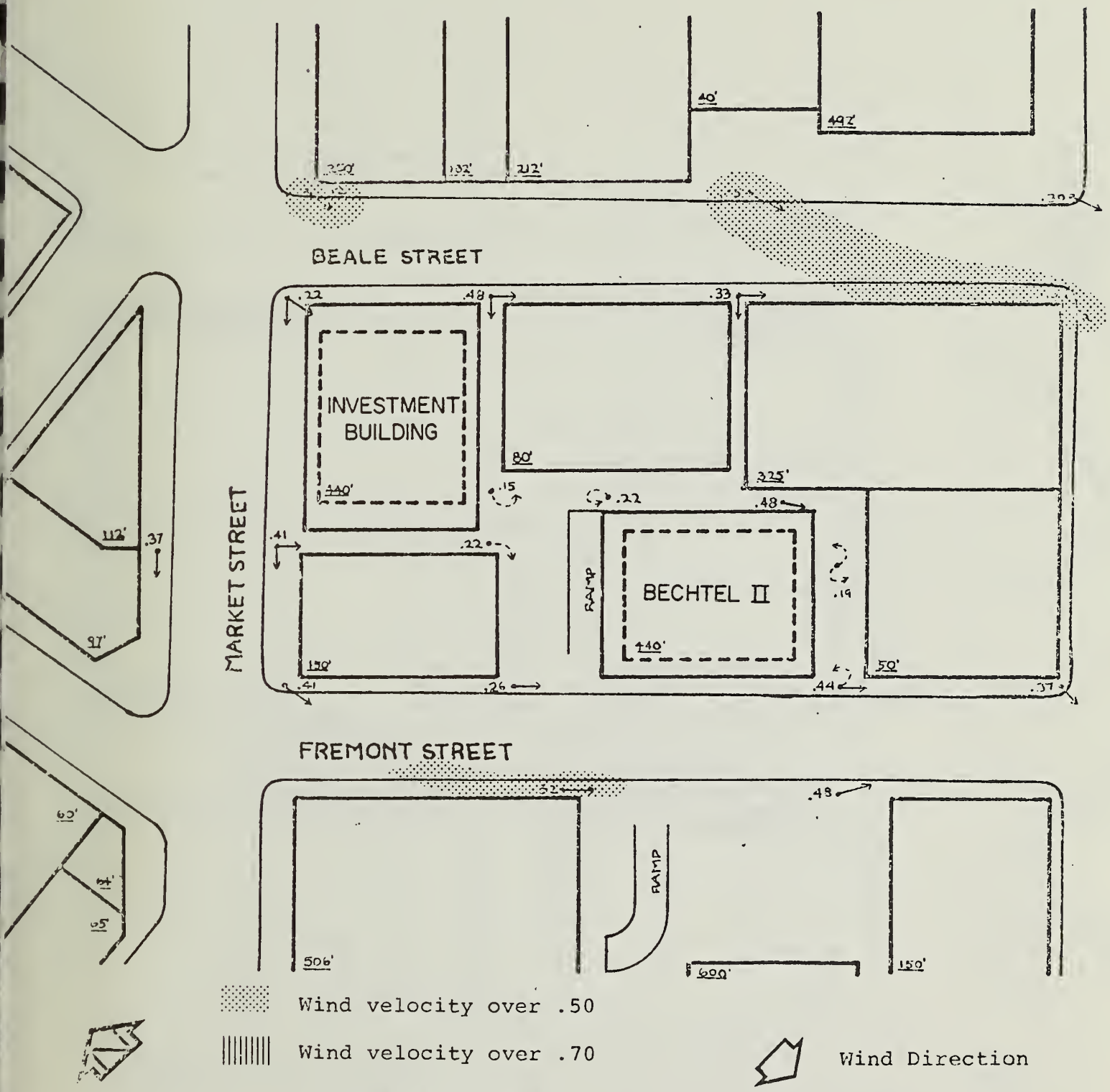


FIGURE 9 - FUTURE SITE NORTH WIND.
Windspeeds are expressed as a fraction of wind recorded by S.F. Weather Station at elevation 132 feet.

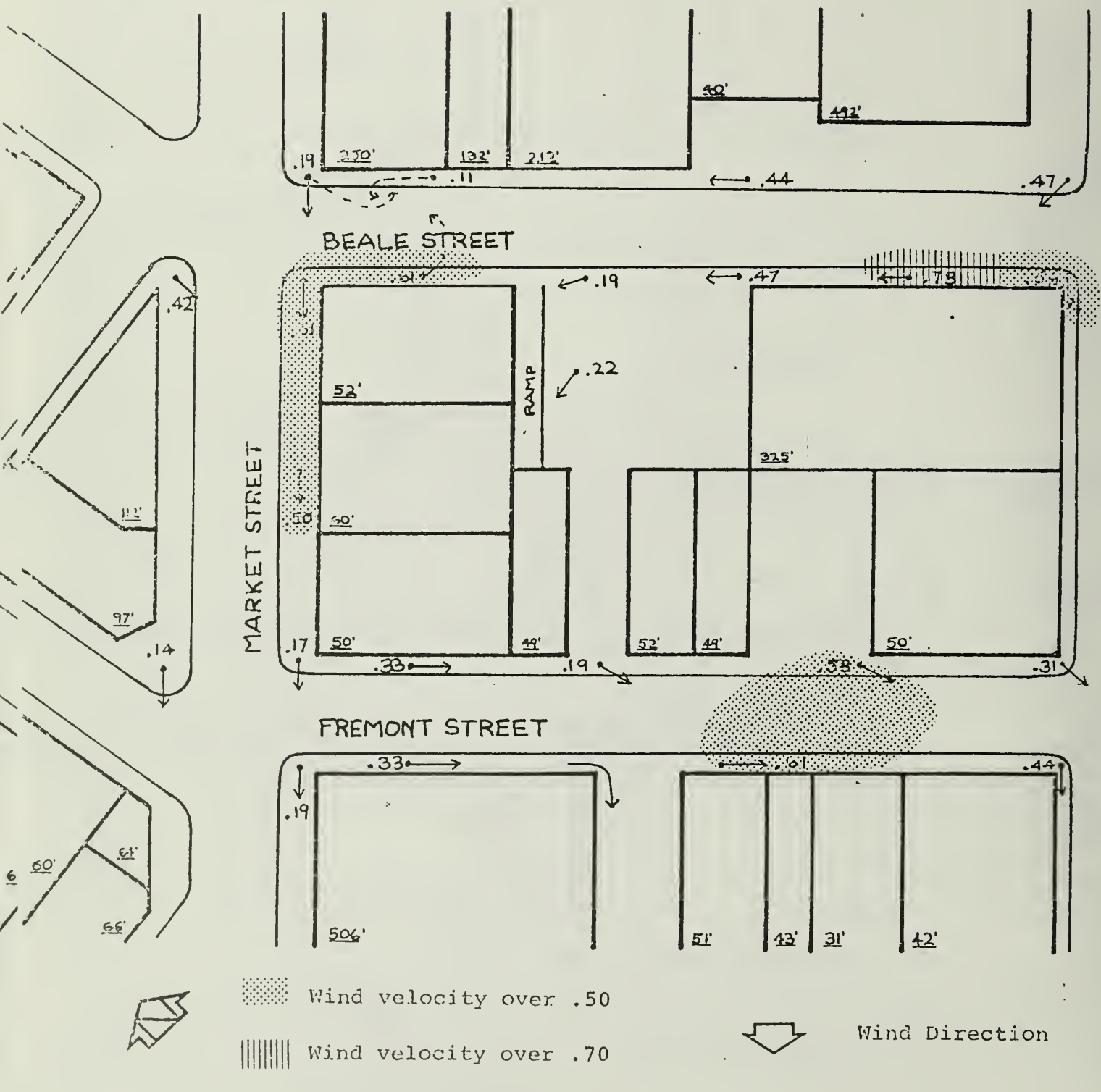


FIGURE 10 - EXISTING SITE NORTHEAST WIND.
Windspeeds are expressed as a fraction of wind recorded by S.F. Weather Station at elevation 132 feet.

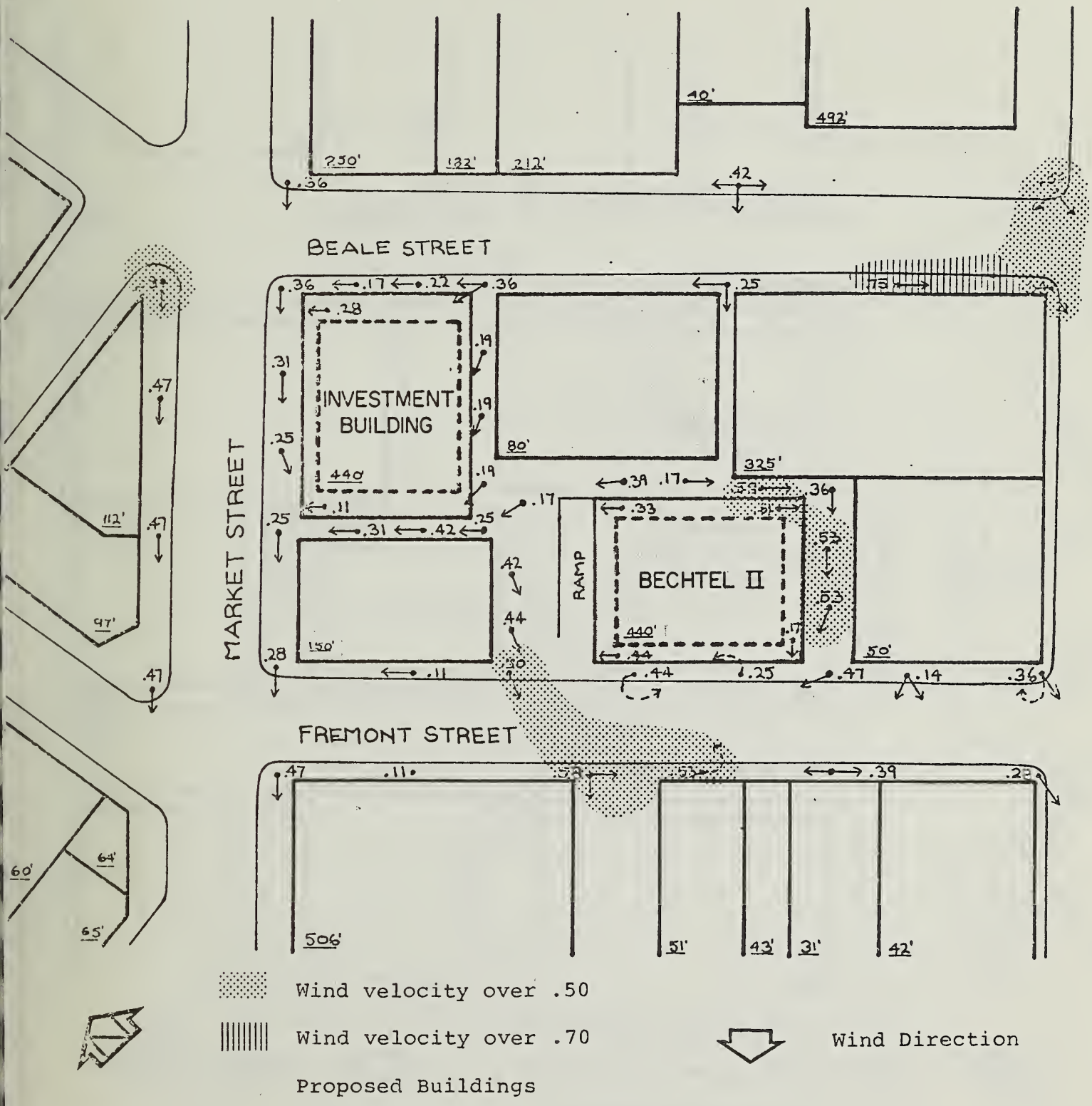


FIGURE 11 - PROPOSED SITE NORTHEAST WIND.
Windspeeds are expressed as a fraction of wind recorded by S.F. Weather Station at elevation 132 feet.

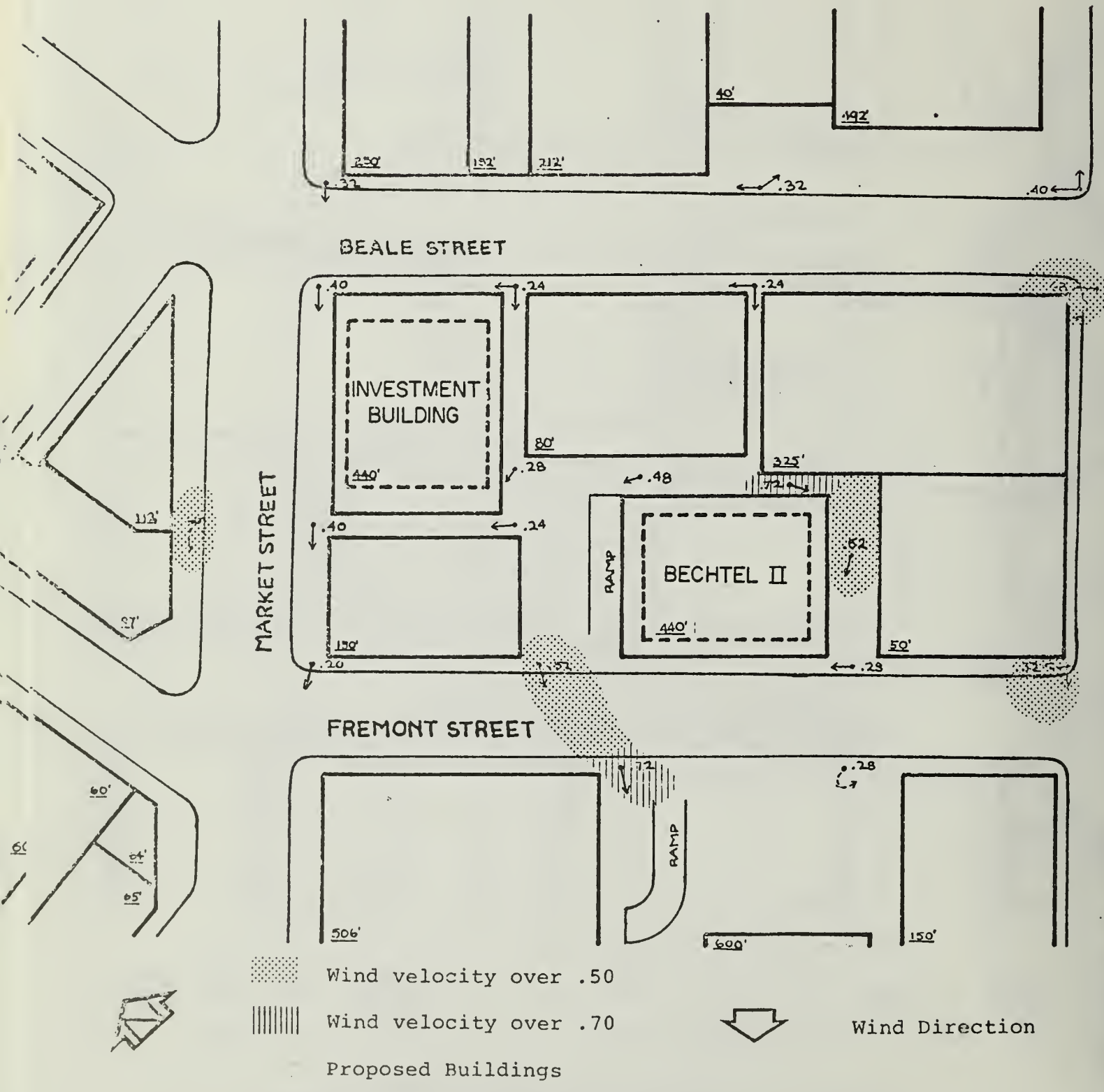


FIGURE 12 - FUTURE SITE NORTHEAST WIND.
Windspeeds are expressed as a fraction of wind recorded by S.F. Weather Station at elevation 132 feet.

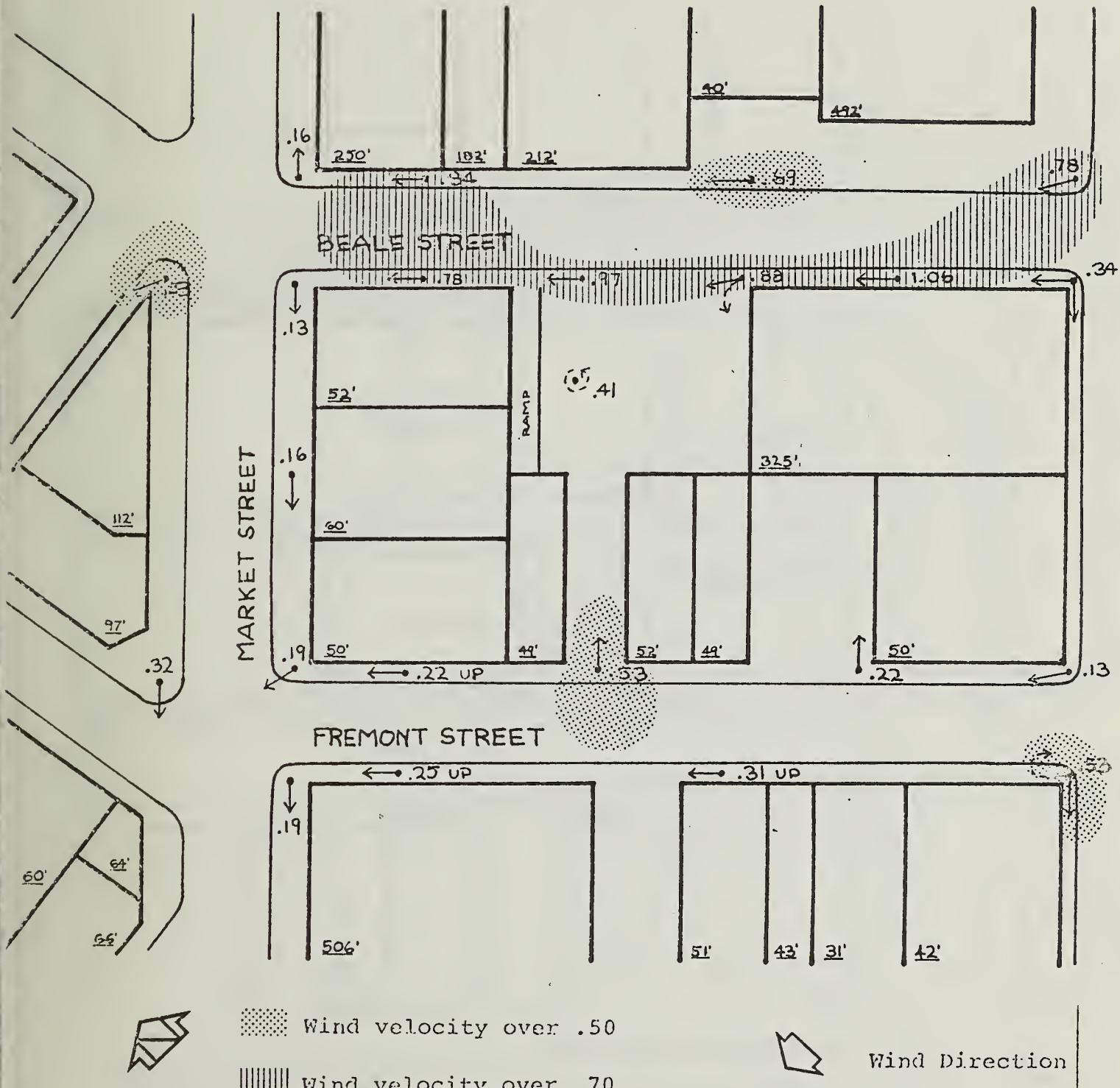


FIGURE 13 - EXISTING SITE EAST WIND.
Windspeeds are expressed as a fraction of wind recorded by S.F. Weather Station at elevation 132 feet.

WIND TUNNEL STUDY FOR DAMES & MOORE

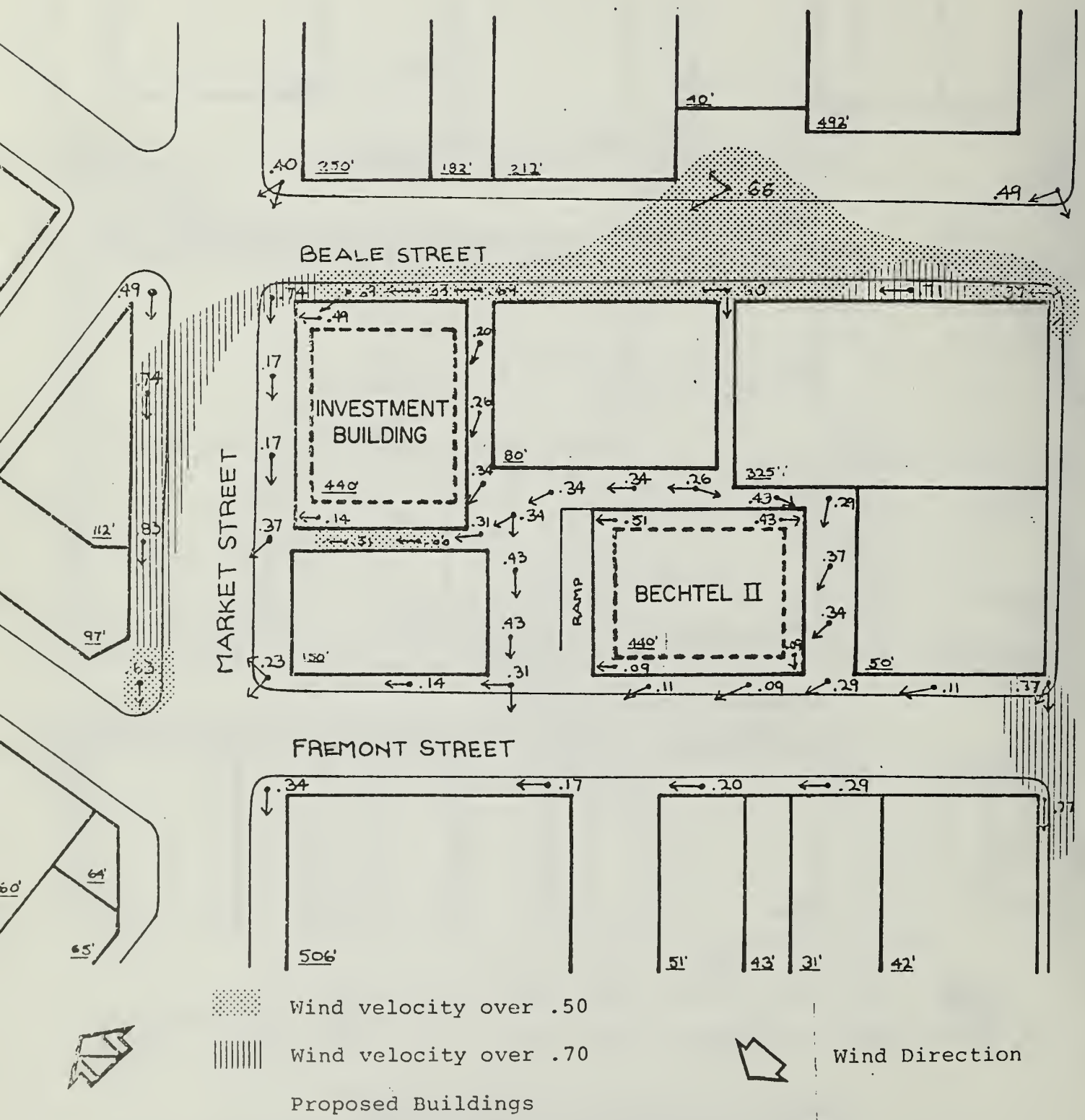


FIGURE 14 - PROPOSED SITE EAST WIND.
Windspeeds are expressed as a fraction of wind recorded by S.F. Weather Station at elevation 132 feet.

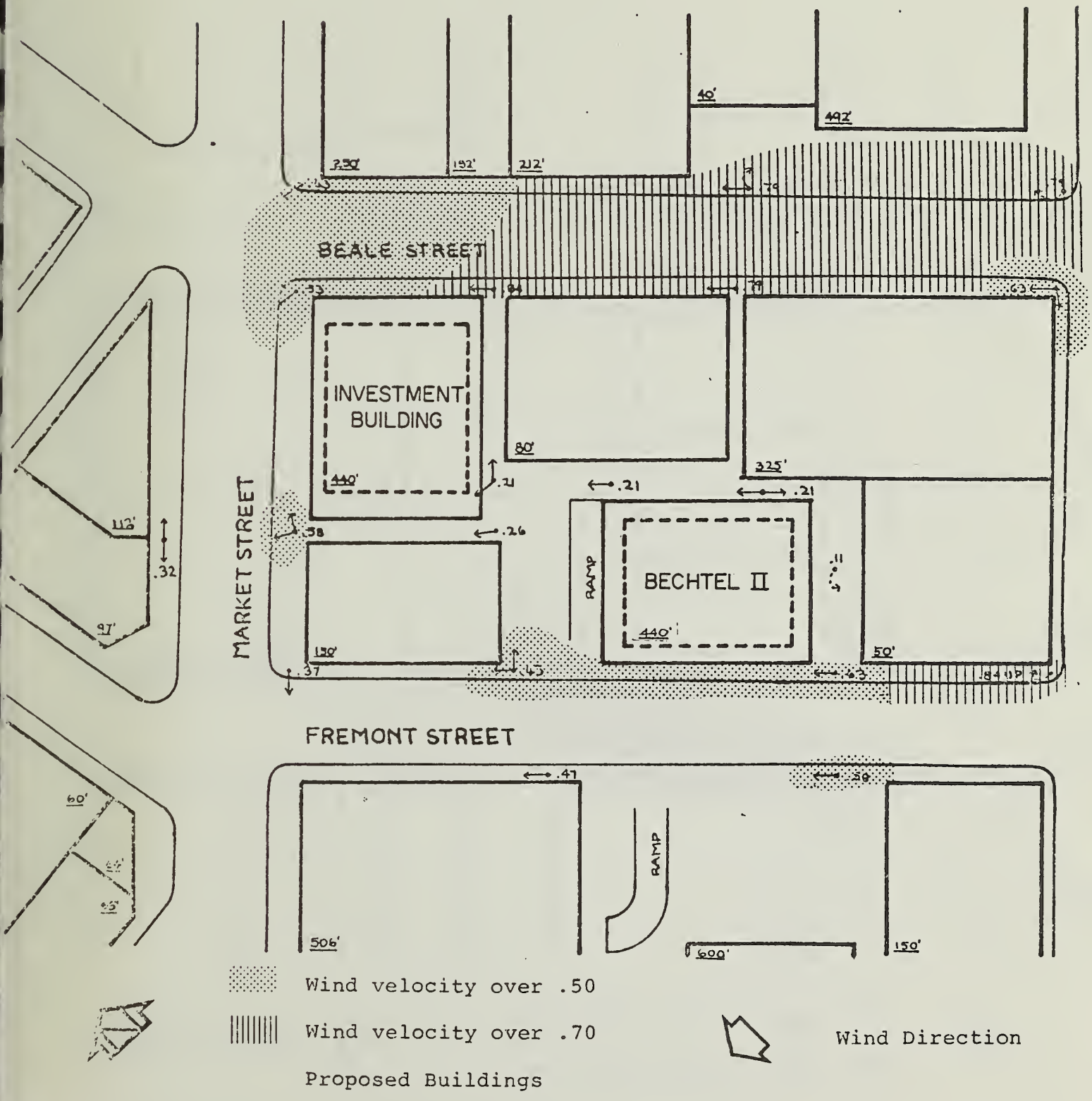


FIGURE 15 - FUTURE SITE EAST WIND.
Windspeeds are expressed as a fraction of wind recorded by S.F. Weather Station at elevation 132 feet.

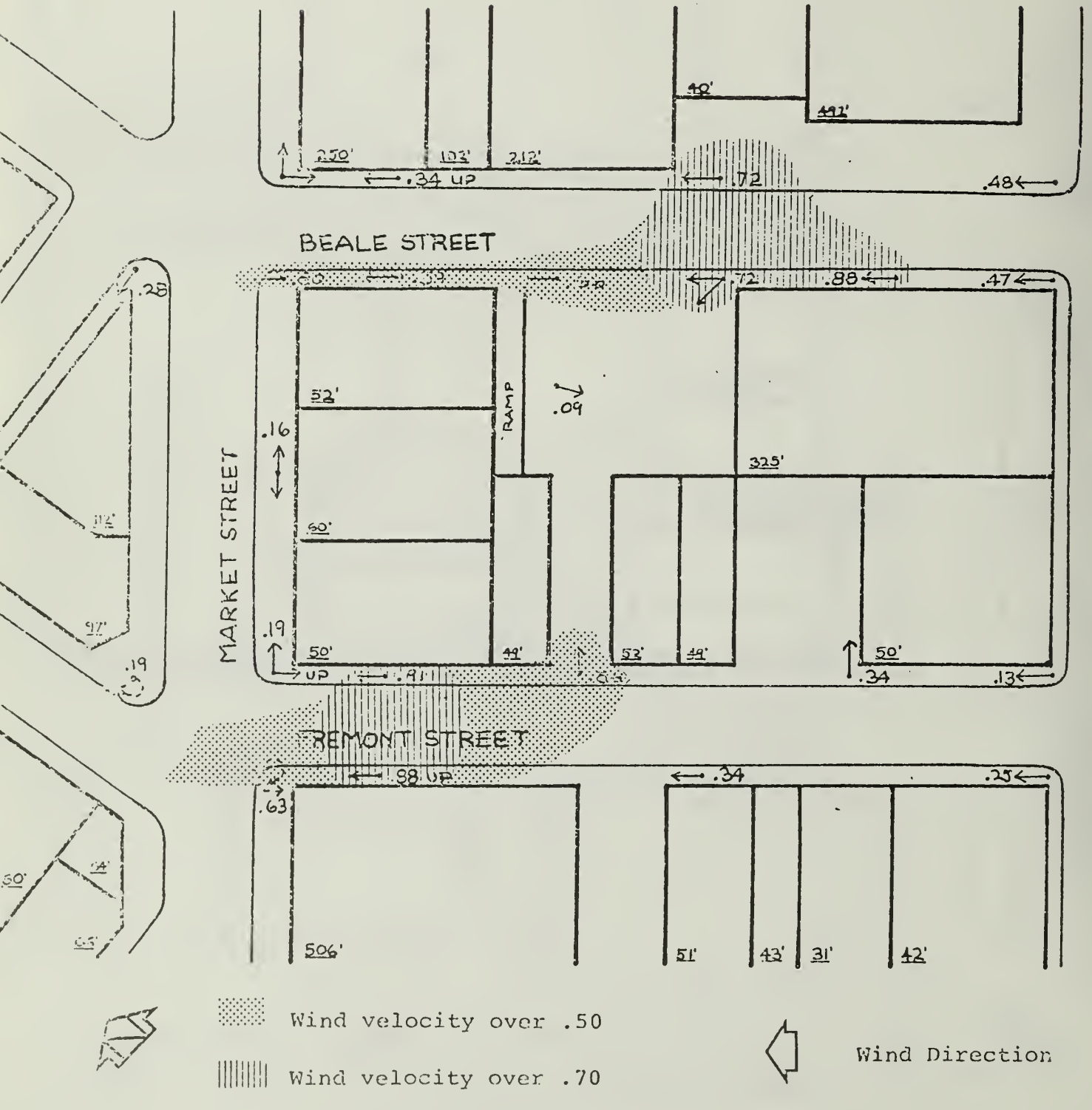


FIGURE 16 - EXISTING SITE SOUTHEAST WIND.
Windspeeds are expressed as a fraction of wind recorded by S.F. Weather Station at elevation 132 feet.

WIND TUNNEL STUDY FOR DAMES & MOORE

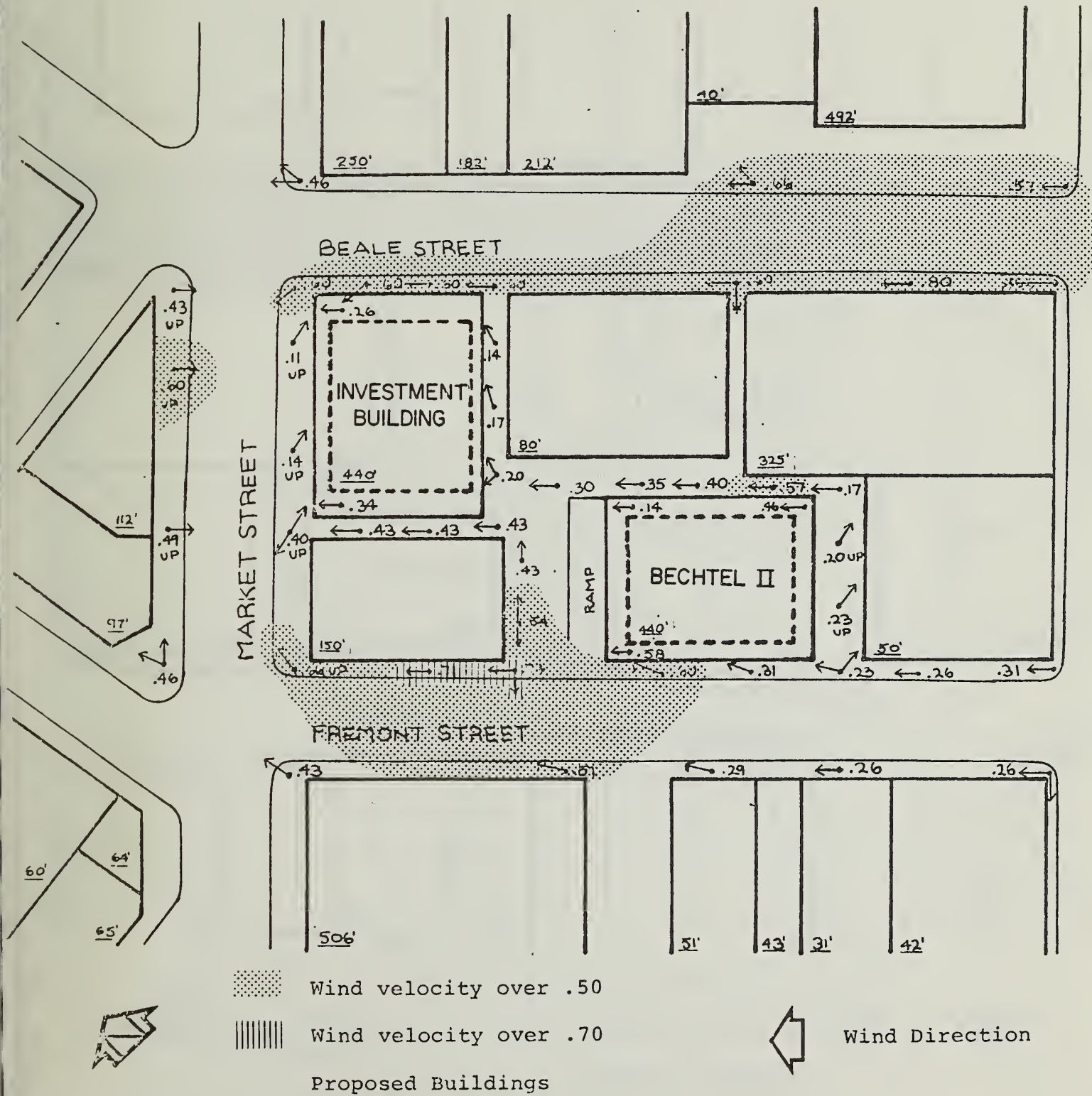


FIGURE 17 - PROPOSED SITE SOUTHEAST WIND.
Windspeeds are expressed as a fraction of wind recorded by S.F. Weather Station at elevation 132 feet.

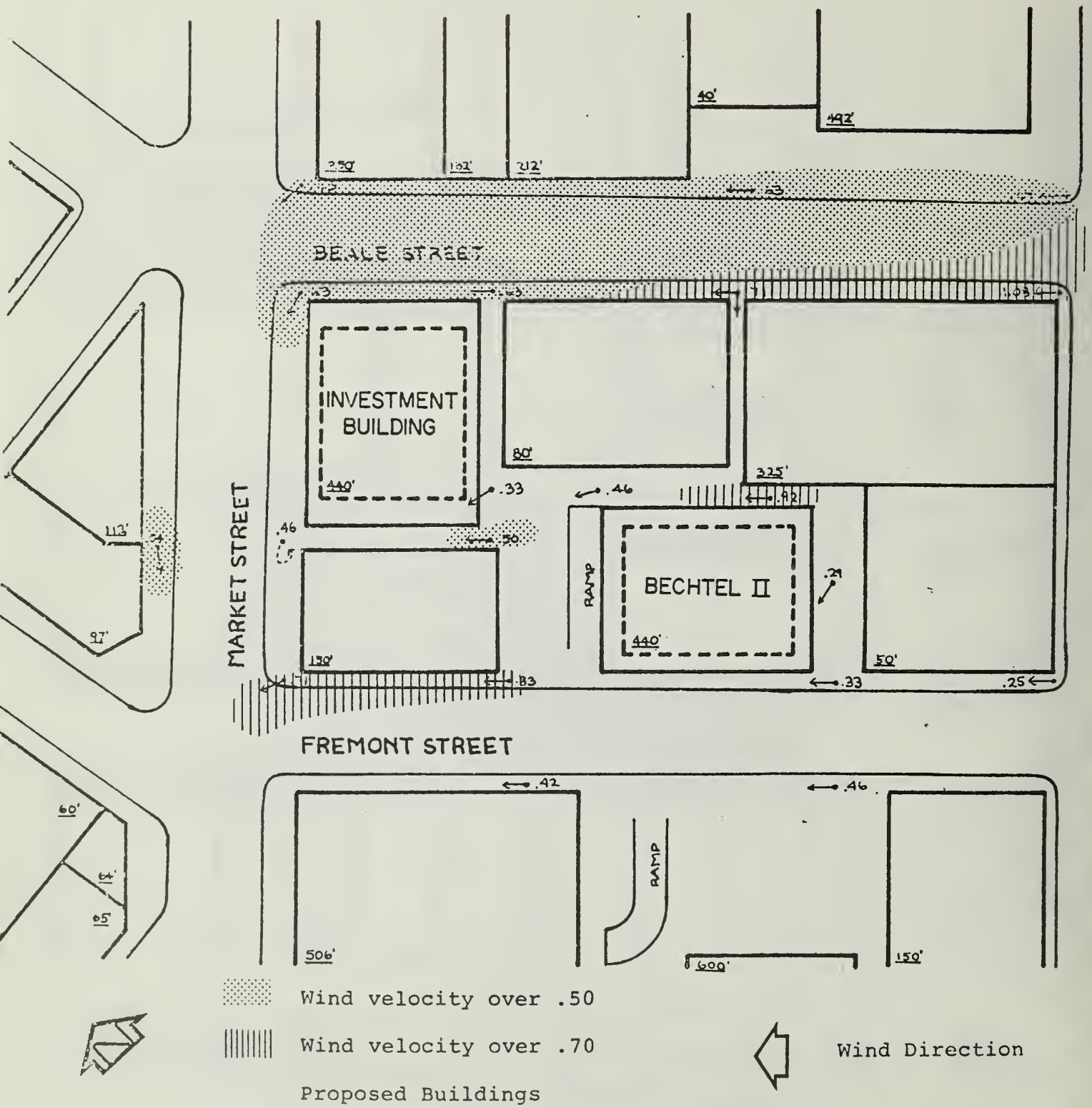


FIGURE 18 - FUTURE SITE SOUTHEAST WIND.
Windspeeds are expressed as a fraction of wind recorded by S.F. Weather Station at elevation 132 feet.

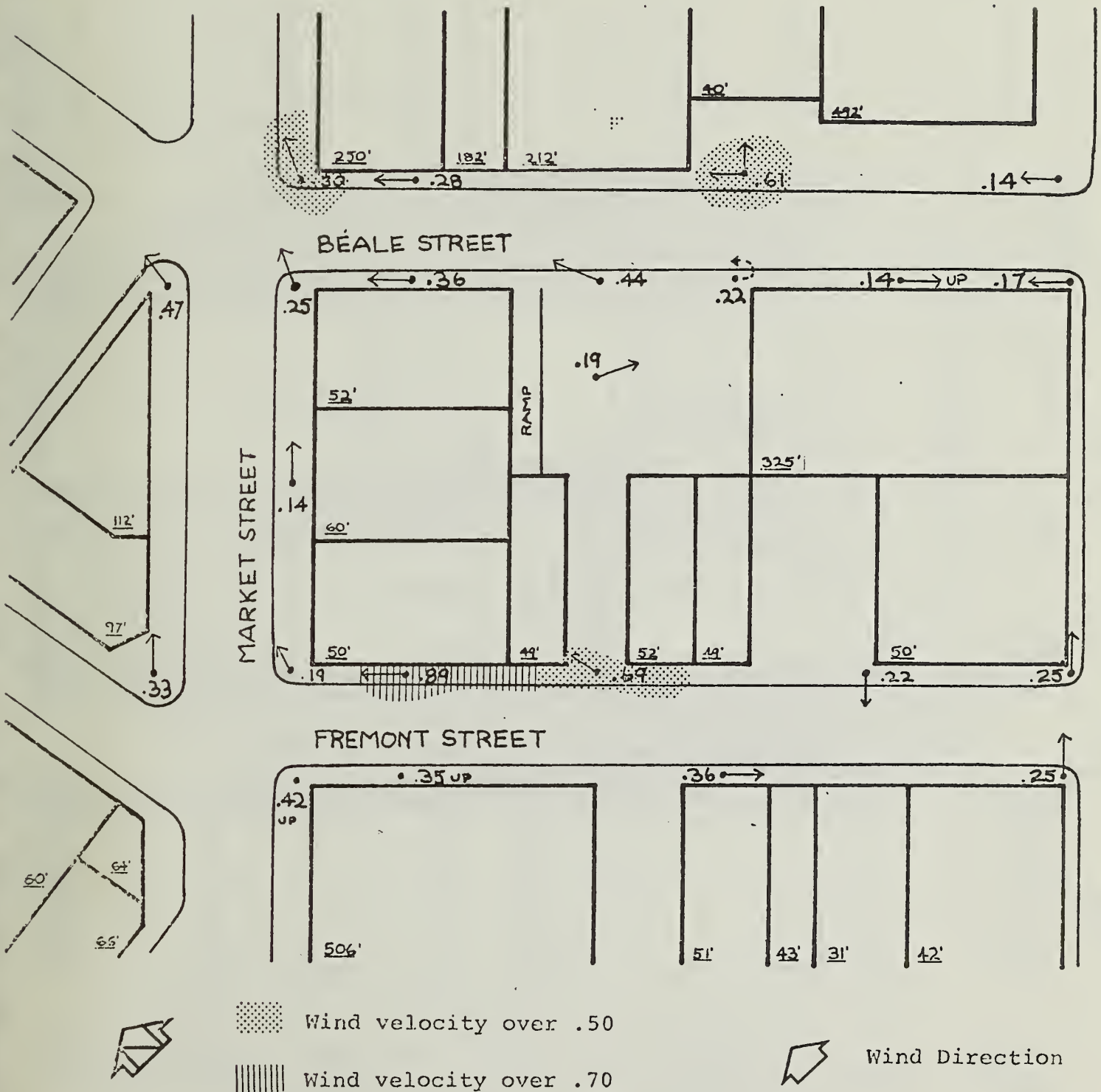
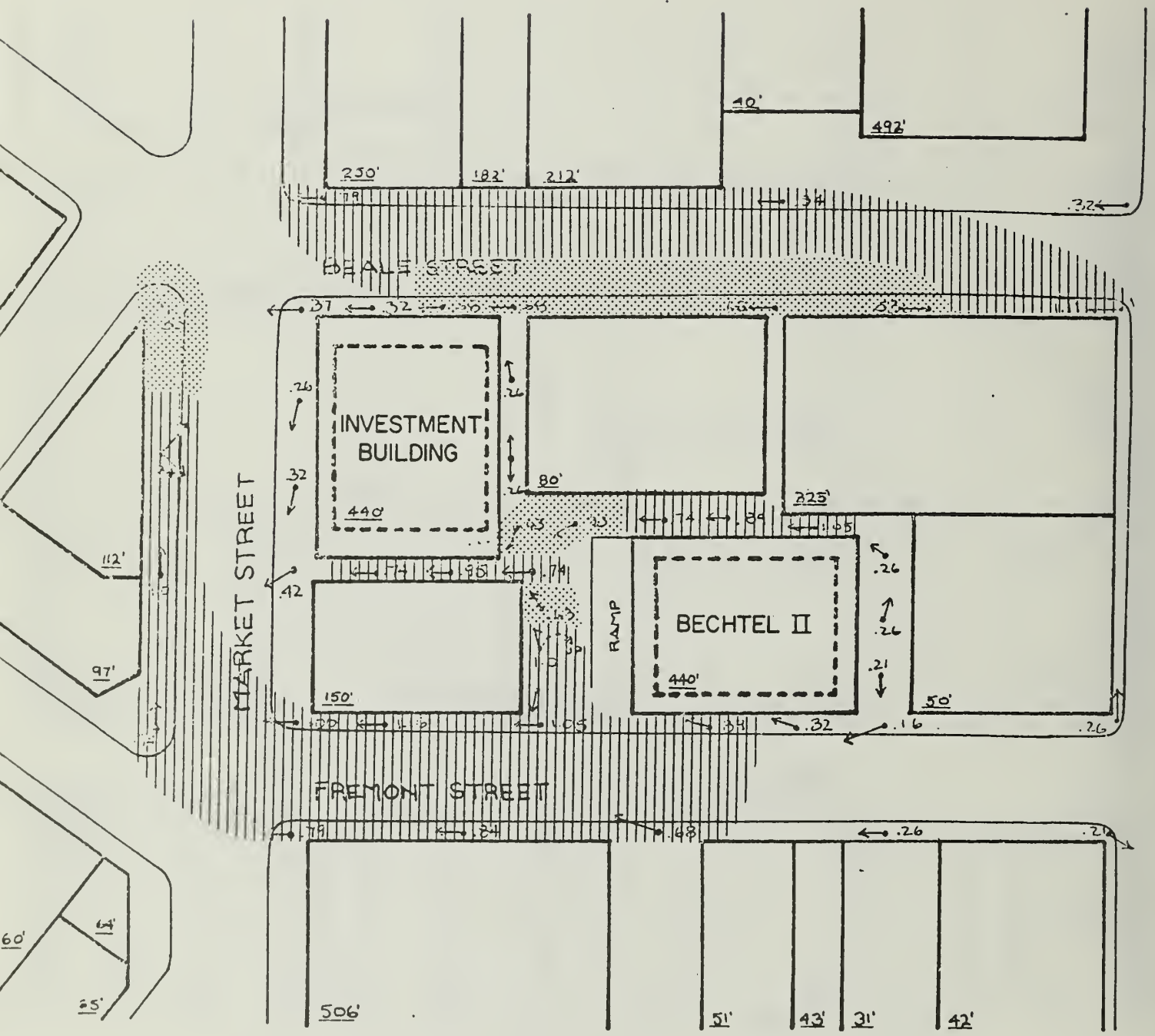


FIGURE 19 - EXISTING SITE SOUTH WIND.
Windspeeds are expressed as a fraction of wind recorded by S.F. Weather Station at elevation 132 feet.

WIND TUNNEL STUDY FOR DAMES & MOORE



Wind velocity over .50

Wind velocity over .70

Proposed Buildings

Wind Direction

FIGURE 20 - PROPOSED SITE SOUTH WIND.
Windspeeds are expressed as a fraction of wind recorded by S.F. Weather Station at elevation 132 feet.

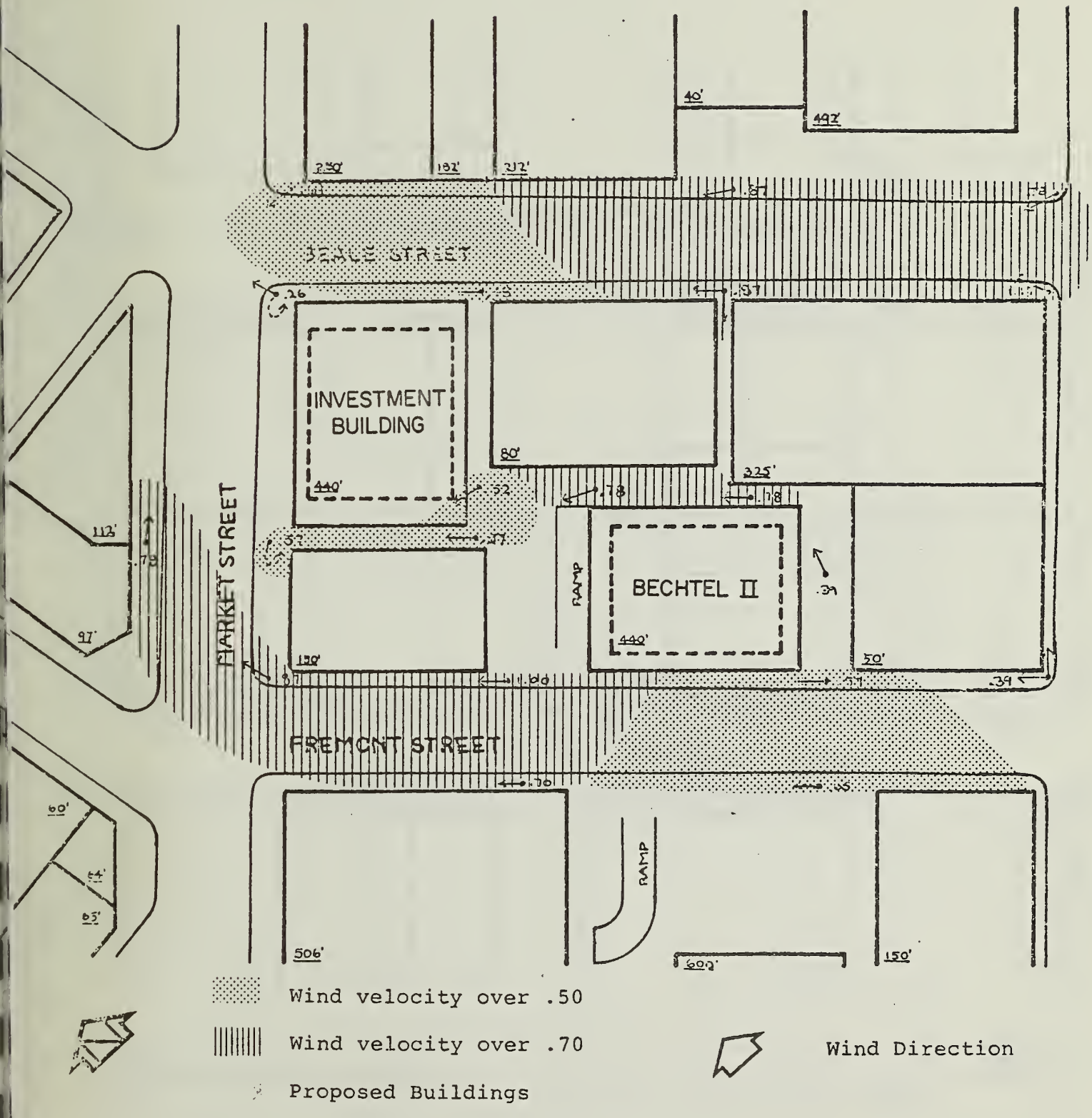
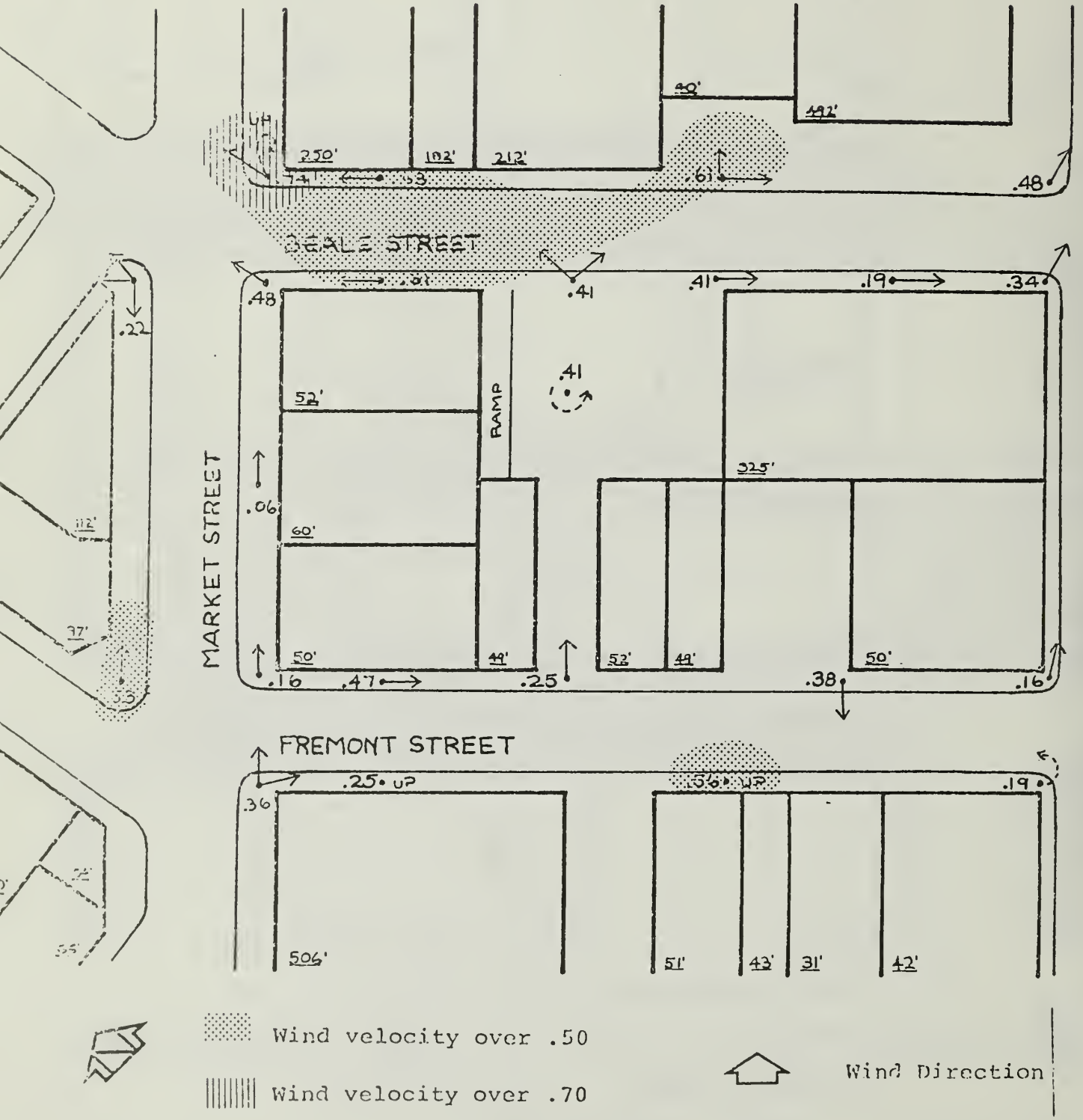


FIGURE 21 - FUTURE SITE SOUTH WIND.
Windspeeds are expressed as a fraction of wind recorded by S.F. Weather Station at elevation 132 feet.



Wind velocity over .50

Wind velocity over .70

Wind Direction

FIGURE 22 - EXISTING SITE SOUTHWEST.
Windspeeds are expressed as a fraction of wind recorded by S.F. Weather Station at elevation 132 feet.

WIND TUNNEL STUDY FOR DAMES & MOORE

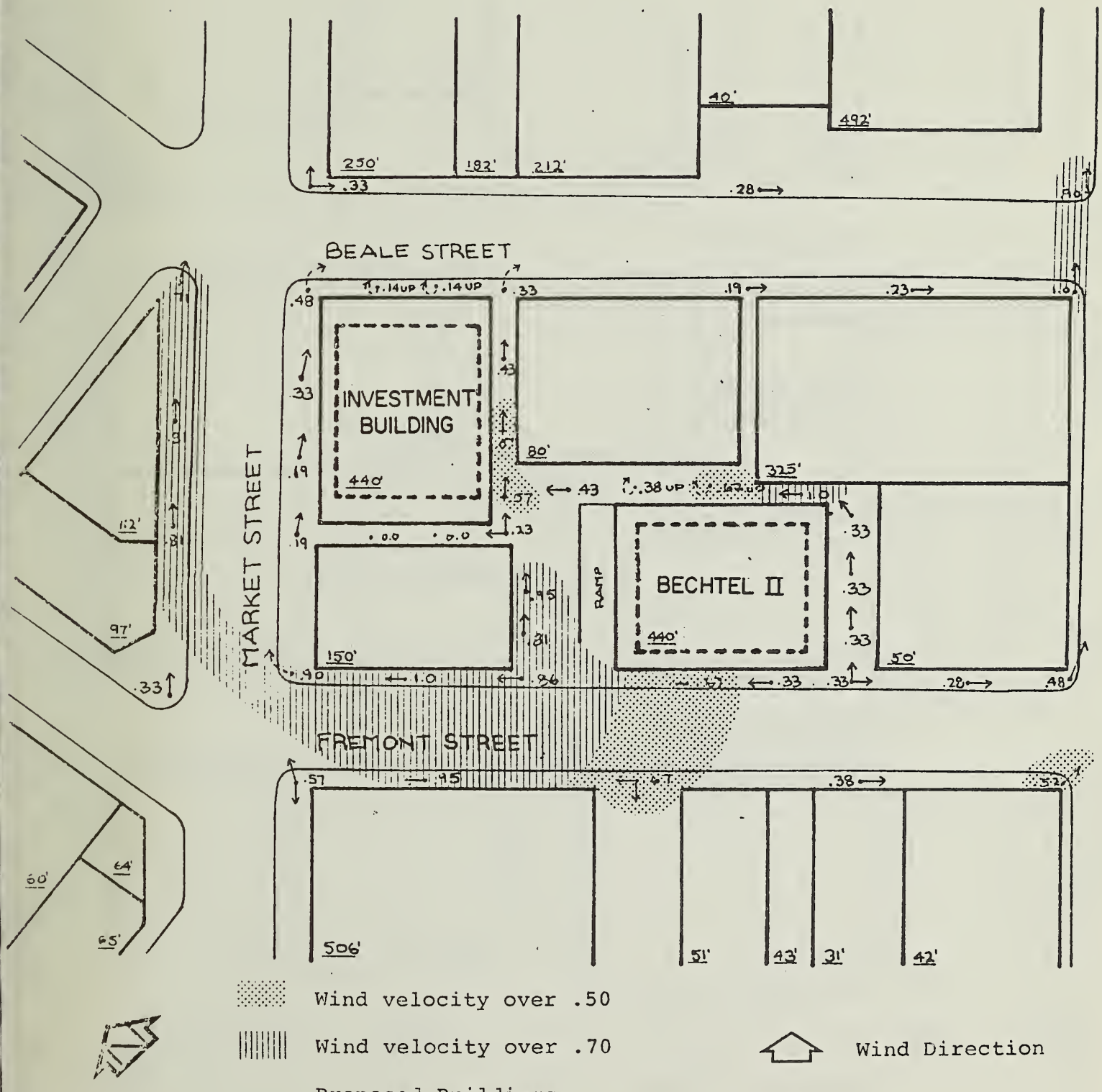


FIGURE 23 - PROPOSED SITE SOUTHWEST.
Windspeeds are expressed as a fraction of wind recorded by S.F. Weather Station at elevation 132 feet.

WIND TUNNEL STUDY FOR DAMES & MOORE

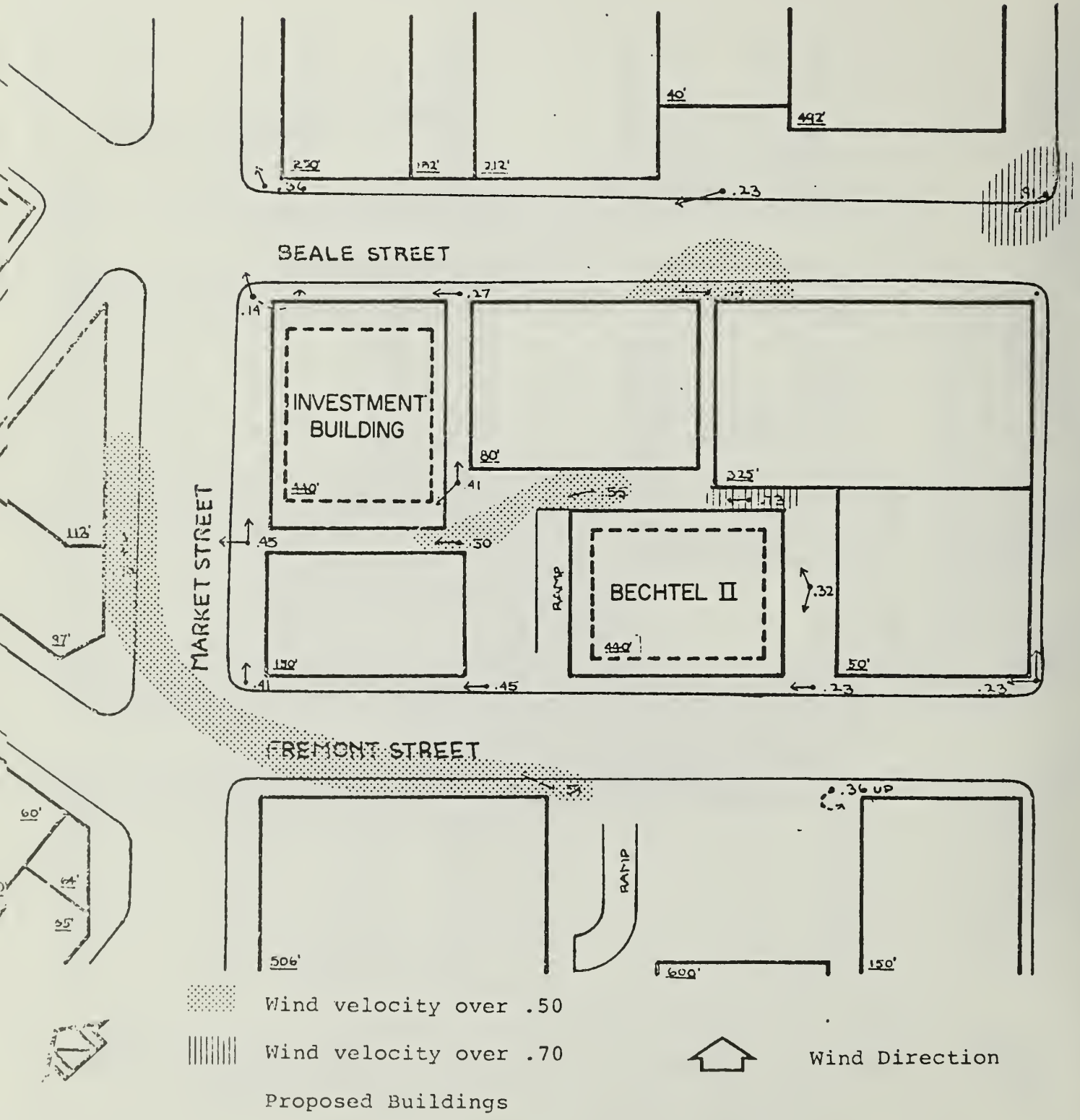


FIGURE 24 - FUTURE SITE SOUTHWEST.
Windspeeds are expressed as a fraction of wind recorded by S.F. Weather Station at elevation 132 feet.

WIND TUNNEL STUDY FOR DAMES & MOORE

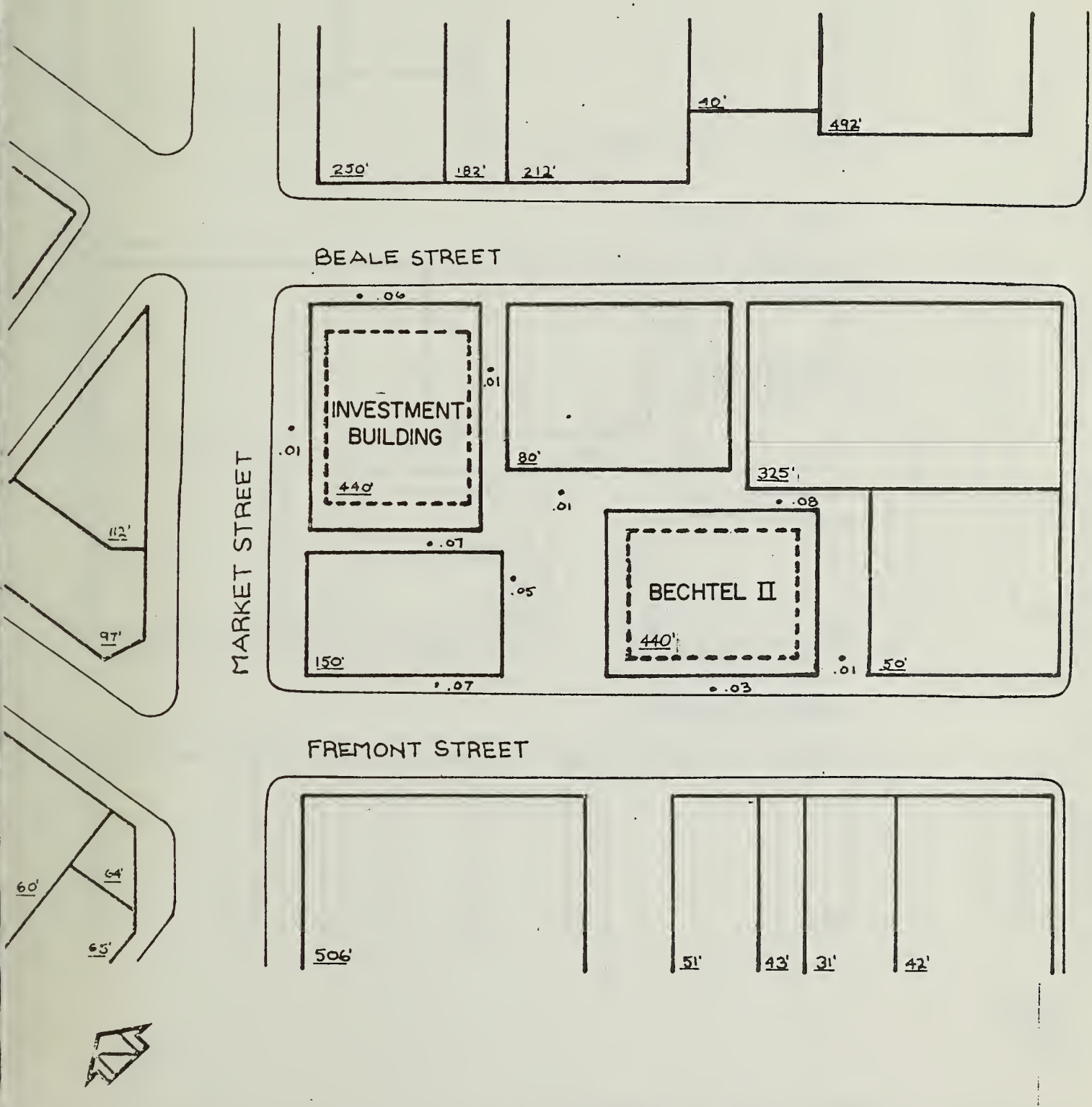


FIGURE 25 - COMFORT DIAGRAM FOR WINTER, 1 p.m.
Figures are the fraction of time that discomfort will be experienced.

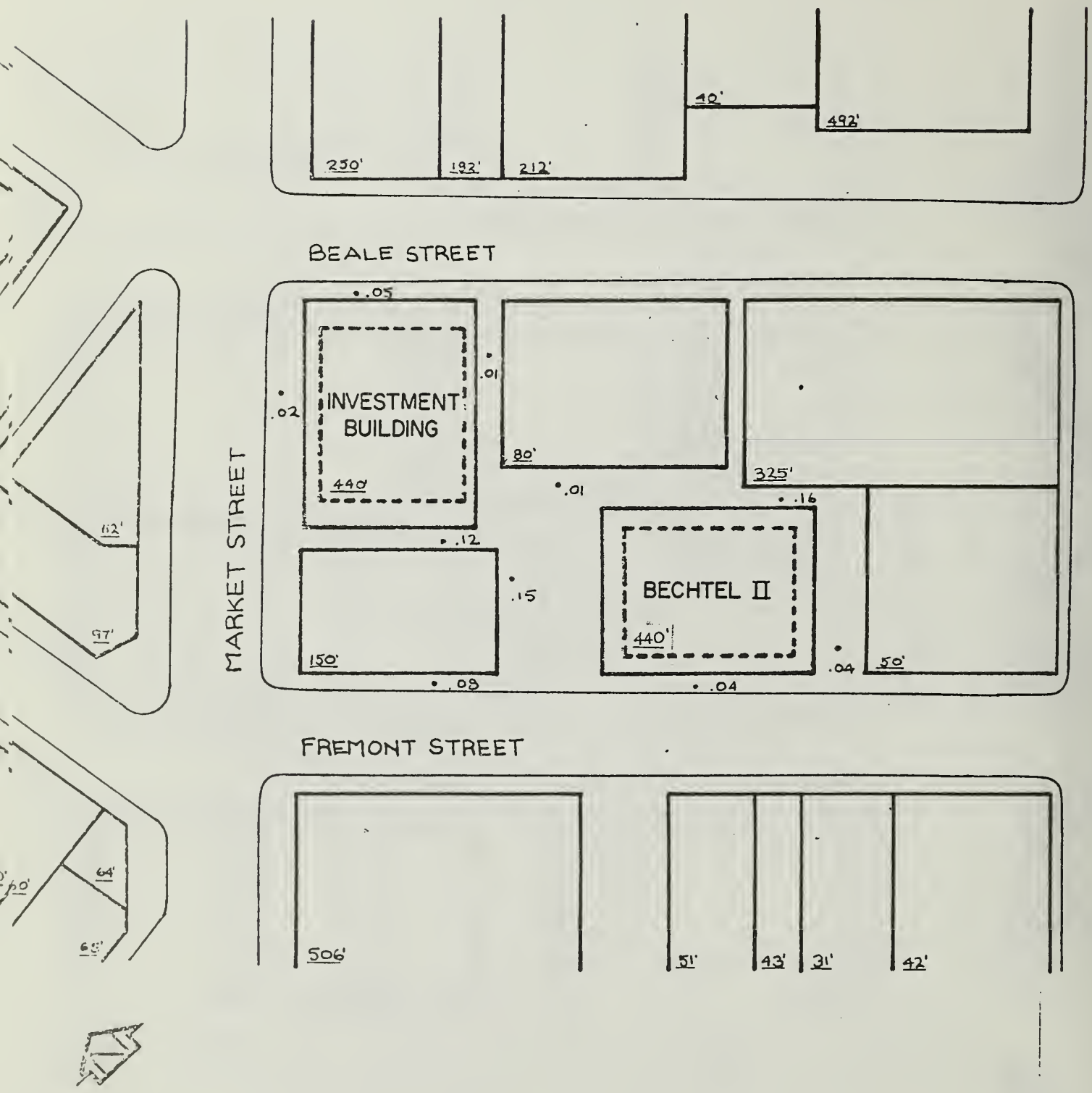


FIGURE 26- COMFORT DIAGRAM FOR SPRING, 1 p.m.
Figures are the fraction of time that discomfort will be experienced.

WIND TUNNEL STUDY FOR DAMES & MOORE

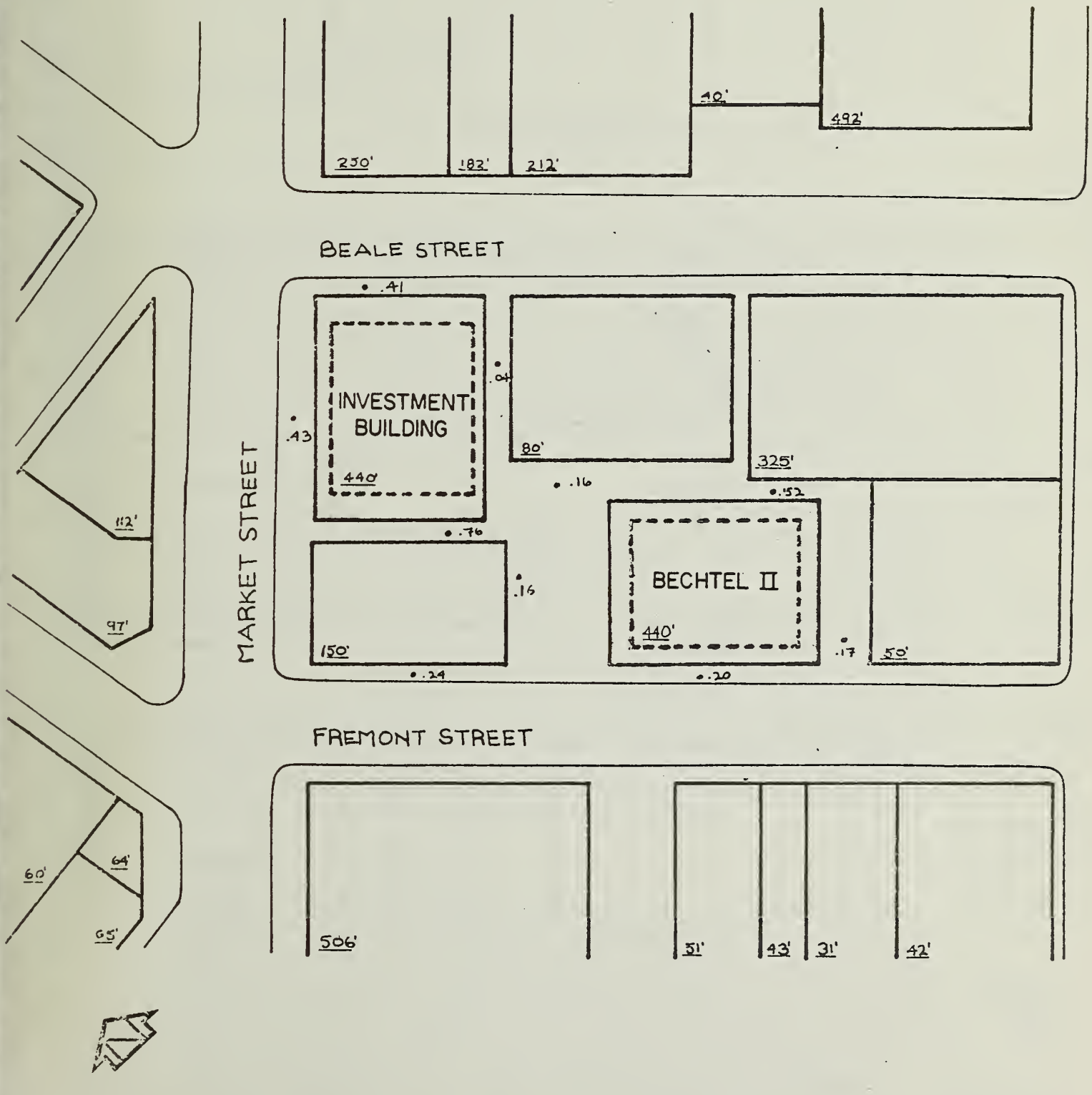


FIGURE 27 - COMFORT DIAGRAM FOR SUMMER, 1 p.m.
Figures are the fraction of time that discomfort will be experienced.

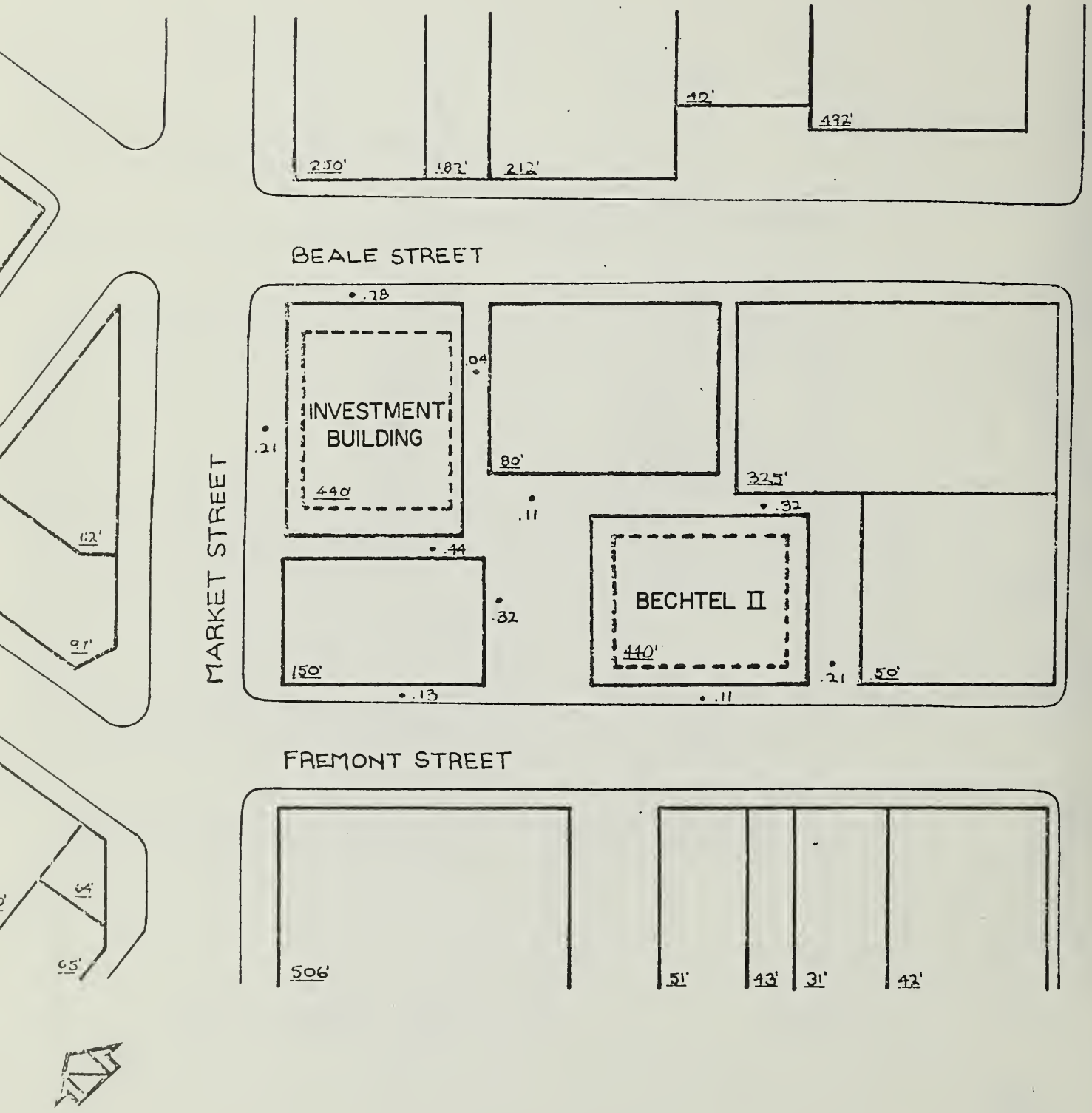


FIGURE 28 - COMFORT DIAGRAM FOR FALL, 1 p.m.
Figures are the fraction of time that discomfort will be experienced.

VII. COMFORT ANALYSIS

While wind velocities themselves are of use and interest, they do not give complete information on the effect of a building on the local climate, or the effect of that climate on human comfort. The elements of climate which have an influence on comfort are temperature, humidity, sunshine, precipitation and wind. Their relative importance varies with the geographical location and the characteristics of the local climate. For the San Francisco region, comfort analysis requires information for wind, temperature, solar radiation, and rain.

Climatic Data

Wind data is recorded at the Federal Building on Fulton Street, but has not been analyzed extensively, and is only given in terms of monthly averages. The extensive data required for comfort analysis is available, however, from the San Francisco International Airport. In this study the airport data has been modified to approximate Federal Building data by multiplying it by the ratios of the monthly averages for the two locations. These ratios vary systematically throughout the year, suggesting good correlations between the sites. This would be expected, as both areas are dominated by the same climatic conditions. Temperature data and sun and rain probabilities are available from the Federal Building.

Comfort Calculations

Comfort and discomfort in the wind is caused by both mechanical effects (flapping clothing, blowing dust and rain) and thermal cooling. The mechanical effects are usually assured to occur above a velocity limit of about 12 mph (Penwarden, 1973); thermal cooling can cause discomfort at lower speeds. The rate of thermal cooling is also dependent on the physical activity and the clothing levels of pedestrians, in addition to the climatic elements mentioned.

Calculations of human comfort frequencies are prepared using a series of physical and empirical relationships which take into account thermal cooling, windspeed, temperature, radiation, clothing level and pedestrian activity (Arens, 1972). The computations used here assume a level of physical activity equivalent to walking slowly at 2.5 mph. The level of clothing insulation is assumed to be equivalent to a standard American business suit during summer and fall, and this with overcoat and hat added during the winter and spring. The insulation value of the summer and fall clothing is one-half that of the winter and spring clothing. Unfortunately, women's clothing ensembles have never been tested experimentally for their insulation value. Theoretical calculations show that a dress outfit is roughly 25% less efficient than man's clothing, depending on style, because of the greater area of uninsulated body surface. The discomfort probabilities for women wearing dresses are therefore proportionately higher than for men.

Areas of sun and shade are plotted for each day and hour of interest, and the probability of cloudiness determined. Combining this information with temperature data, a maximum acceptable windspeed for comfort is determined for each point of interest. Using climatological data for the appropriate season and hour of the day, and the data obtained in the wind tunnel research, the percentage of time that the maximum permissible wind is exceeded is calculated. These are calculated for each wind direction at each point, then are weighted by the frequency of each wind direction for that particular season. The result is a description of the percentage of time that discomfort is experienced at the site, and the probability of discomfort being experienced during selected hours of the day.

Interpretation of Results

The comfort analysis was done for 1 p.m. on the first day of each season. The hour chosen was assumed to correspond to the time when people would most want to be outdoors, either to eat lunch, shop, or go for a walk.

The results of discomfort probability calculations depend heavily on the levels of clothing and activity assumed for the pedestrians. Since these factors are usually extremely variable among people, it is not possible to absolutely predict discomfort for a population. As a

result, the comfort maps for winter and spring cannot be compared to those of summer and fall without realizing the confining assumptions which have been made. The comfort maps are best viewed individually, in which they give a good relative index of comfortable and uncomfortable locations. This index integrates the probabilities of all the climatic elements into a single figure representing probability, and is consistent for all locations on that chart.

High windspeeds, turbulence, and updrafts can have adverse affects on human comfort in the rain by upsetting rain protection strategies by making umbrellas difficult to use, and causing fluctuations in rainfall trajectories.

The effect of rainfall has not been integrated into the comfort maps. It is reasonable to assume that the existence of rainfall causes all outdoor spaces to be uncomfortable, although the discomfort can be much worse when rain is wind driven. When rainfall is taken into consideration, the actual frequencies of discomfort for the winter and spring would be considerably higher. Rain occurs 12.2% of the time in January, 5.4% in April, 0.1% in July, and 3.1% in October. The rain is strongly associated with winds from the directions southeast through southwest.

Winter

Discomfort frequencies for winter are shown in Figure 25. It can be seen that the relatively uncomfortable areas are in the passage between Bechtel I and Bechtel II buildings; in the passage between the Market-Beale Building, and the Market-Fremont Building; on the sidewalk southwest of the Market-Fremont Building; and on the sidewalk to the northeast of the Market-Beale Building. All these discomfort areas except for the area on Fremont Street are in the shade, and are prone to strong winds during the southerly quadrant winds which are common in the winter and are associated with 75% of the rain in San Francisco. The low probabilities of discomfort indicated result from the generally low winds in winter, the assumption that pedestrians will be wearing overcoats and hats, and that the figures do not include discomfort due to rain.

Spring

Discomfort frequencies for spring are shown on Figure 26. The general wind increase experienced in spring causes higher discomfort probabilities at the four locations

mentioned above, as well as on the northside of the plaza. Again, all sites except that on the Fremont Street sidewalk are in the shade.

Summer

Figure 27 shows that high probabilities of discomfort are expected in some areas during summer. This is due to the higher windspeeds of summer, and the assumption that pedestrians are wearing indoor clothing. Very high frequencies of discomfort are found in passageways between buildings oriented northwest-southeast. These high values are attributable to the lack of sunshine in these areas, and the high frequency of northwest winds in the summer. Other areas of the site have much lower levels of discomfort, due to greater shelter and sunshine. An exception is the area near Market and Beale Streets, where lack of sunshine causes moderately high discomfort levels.

Fall

During fall, San Francisco generally experiences its mildest weather, as the persistent summer seabreeze and low cloudiness subsides. This is reflected in lower discomfort values than for summer. The pattern is much the same as in summer, with northwest-southeast corridors experiencing highest discomfort values. Discomfort frequencies in the plaza have increased, due to longer shadows cast by adjacent buildings. Areas along Beale Street, as well as the passageway between the Market-Fremont building and the parking garage, have low discomfort frequencies, as these areas are very sheltered.

VII. SUGGESTED MITIGATING MEASURES

There are two types of mitigating measures. The first is to make major design changes to reduce winds near the project, such as different building orientations or alterations in size or shape. Generally, unless these changes were considered from the outset, major design changes to improve wind conditions are not economically feasible.

The second type of mitigating measure would involve additions to the project that would provide local shelter for pedestrians. There are only two areas in this project where local protection measures would have an appreciable effect. These are the pedestrian passageway between Bechtel I and Bechtel II, and the pedestrian passageway between the Market-Beale Building and the Market-Fremont Building. Since the buildings around these passageways are fairly close to each other, it would be possible to reduce windspeeds by providing roofs or putting low walls and rotating doors in each passageway. Using glass roofs would give the feeling of being outdoors while still providing protection from the wind. Other possible measures include installing open overhead trellises and porous fences or hedges.

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In summary, I would not expect any significant deterioration of the wind environment should only one of the structures be built. Rather, I expect lower windspeeds, except perhaps in isolated areas under certain wind directions.

Please call me if you need further information.

Yours truly,

Donald Ballanti
Micrometeorologist

DB:hlr

cc: Jud Weller, Dames and Moore

APPENDIX D

EXTERIOR NOISE REPORT

APPENDIX D

EXTERIOR NOISE REPORT

120 Howard Street
San Francisco, Calif. 94105
Telephone (415) 495-0450

Bolt Beranek and Newman Inc.

2 January 1975

Mr. William Shuldiner
Bechtel Corporation
111 Pine Street
San Francisco, CA

Subject: Exterior Noise Measurements
Proposed Bechtel Building Sites
BBN Project #145574

Dear Mr. Shuldiner:

This letter will summarize the results of exterior noise measurements made at two proposed Bechtel building sites. These sites are (1) the SW corner of Market and Beale Streets, and (2) mid-block East side on Fremont Street. The measurement procedure included a 24-hour microsampling of exterior noise beginning at approximately 9am on Wednesday, 11 December 1974.

The two graphs attached illustrate the results of an analysis of the measurements at each site. As can be seen, the noise levels fluctuate widely during the 24-hour period. During the daytime hours (approximately 8am to 6pm), the noise level is relatively constant within about 5 dBA. This consistency in daytime sound levels is a common characteristic of urban noise.

The City of San Francisco has recommended that the day/night equivalent sound level (L_{dn}) be used to characterize the exterior acoustic environment of a site. Following the City's recommendation, we find the L_{dn} at both sites to be approximately 73 dB(A). The 73 dB(A) value measured is approximately 2 dB(A) lower than is indicated on the City Noise Map for Beale Street and 3 dB(A) higher than is indicated for Fremont Street.

Since the proposed use for the two sites examined is for commercial, rather than residential use, the daytime sound levels are of special concern. If we compute the equivalent sound level (L_{eq}) for the normal office hours (8am to 6pm), we find levels of 71 dB(A) and 72 dB(A) respectively for the Beale and Fremont

locations. The fact that the daytime equivalent sound levels tend to be lower than the L_{dn} levels is due to the 10 dB weighting factor applied to the nighttime sound levels in the formulation of L_{dn}. Unless residential use is intended for these locations, we would recommend using the daytime L_{eq} rather than the L_{dn} as a design parameter.

There are three additional factors which strongly influence the exterior sound levels at the measured sites. These factors are: (1) the pending relocation of the street car line presently operating on Fremont Street; (2) planned reduction in vehicular noise emission levels; and (3) distance of multi-storied office space from the roadways.

The San Francisco Municipal Railway District (Muni) is currently undertaking a comprehensive railway (track) and equipment rebuilding and retrofit program. When this program is completed, ($\sim$ 2 to 5 years), street cars will no longer be a factor on Fremont Street. The absence of street cars alone should result in a lowering of the present daytime L_{eq} levels at the Fremont St. site by at least 3-5 dB(A).

The State of California Motor Vehicle Code calls for a stepped reduction in the allowable noise emission levels of highway vehicles through the year 1988. The City and County of San Francisco have, in their Transportation Noise Element, endorsed the enforcement of these rules on City streets. Assuming that such enforcement is carried out, it is reasonable to assume that the daytime L_{eq} sound levels at both sites will be lowered 5 dB(A) by the year 1995. [A proration of the overall decrease at the rate of 1 dB every 4 years in the meantime would seem reasonable based on the gradual change in new vehicle population.]

The sound level at the facade of a building falls off at the rate of approximately 5 dB(A) per doubling of distance from the centerline of the roadway. This decrease occurs regardless of the specific direction (horizontal or vertical) from the centerline. Thus at the eighth floor level (distance from centerline of roadway $\sim$ 100'), the daytime L_{eq} would be some 5 dB(A) lower than at ground level.

Taking all of the above factors into account, the maximum exterior L_{eq} used for design of a new office structure would lie in the 65-70 dB(A) range for the first 8 floors, and steadily decrease above that level. In terms of the City Transportation Noise Element, such levels would place the sites in the upper range of category A: "Satisfactory, with no special noise insulation requirements." This finding indicates that while special acoustical design considerations in the building design may be necessary to protect acoustically *critical* spaces on the lower floors, normal building construction techniques will generally suffice.

If you have any questions on the above study, please do not hesitate to call.

Sincerely yours,

BOLT BERANEK AND NEWMAN INC.

Dennis A. Paoletti

DAP:n

cc: Addressee
D.Merrill - SOM

enc: (2)

BOLT BERANEK AND NEWMAN INC.
PROJECT #145574

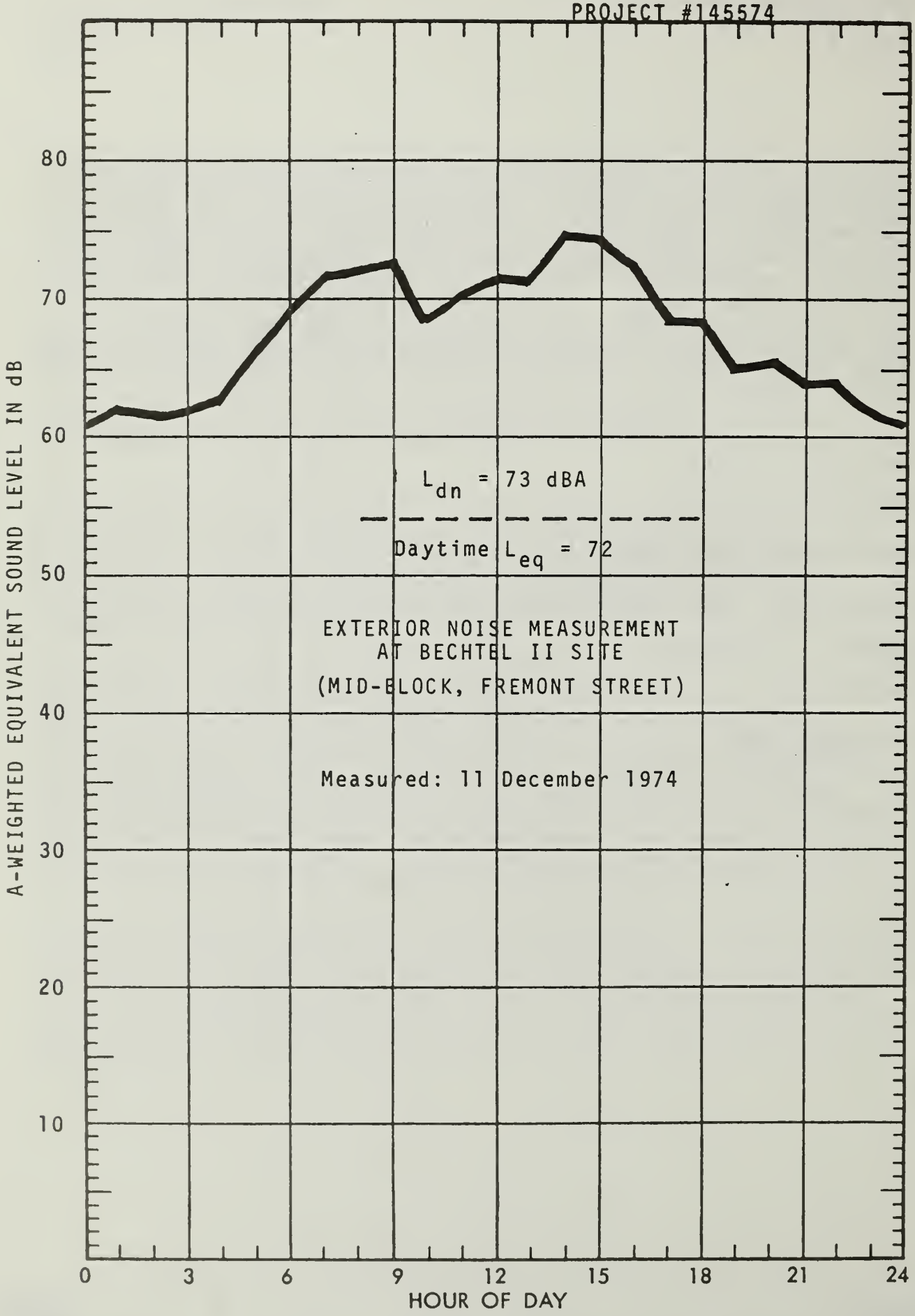

FIGURE 1

BOLT BERANEK AND NEWMAN INC.
PROJECT #145574

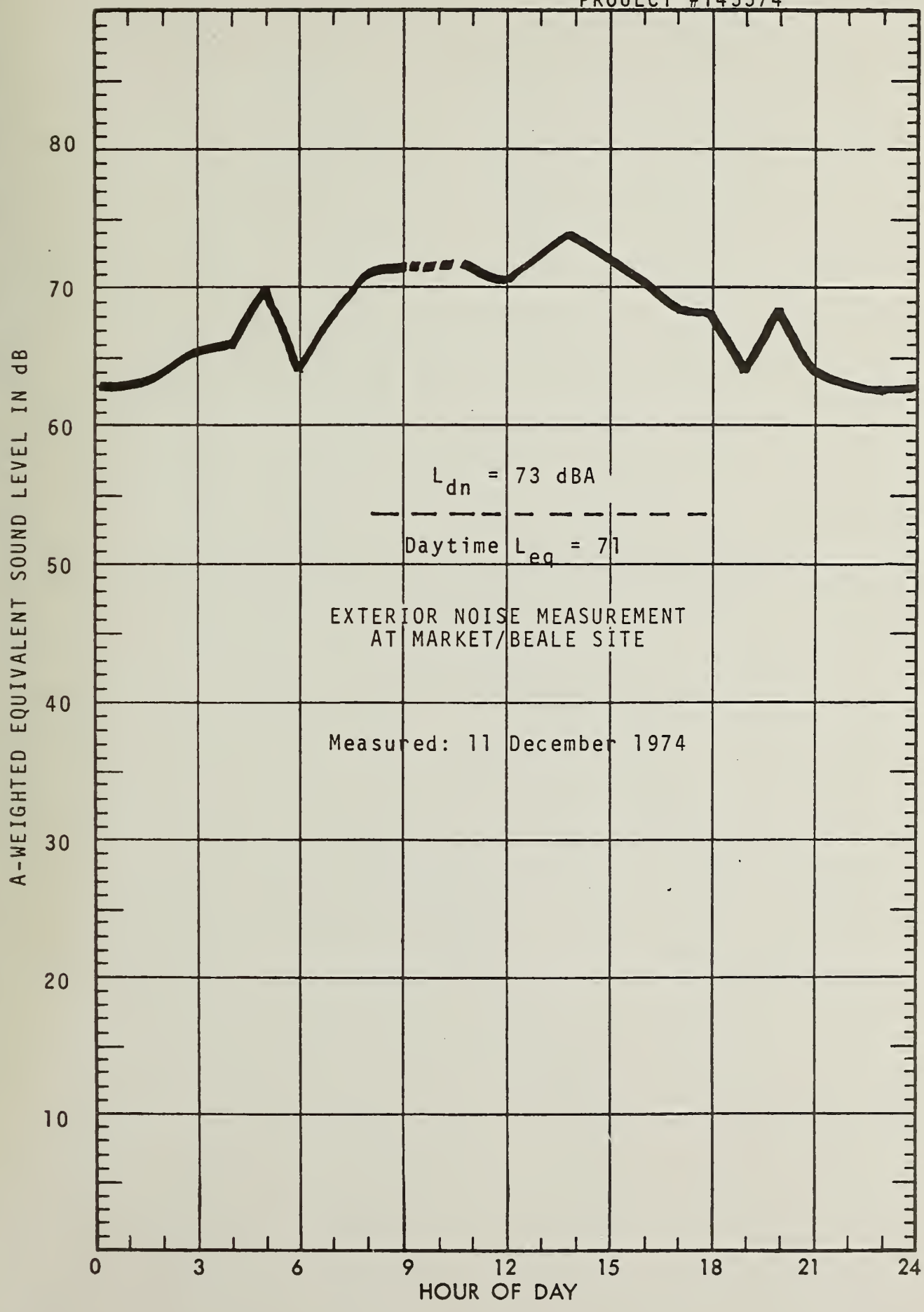

FIGURE 2